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ENGINEER DEPARTMENT, U. S. A.

TABLES

SHOWING

DIFFERENCE OF LEVEL

IN FEET,

CORRESPONDING TO A GIVEN ANGLE, WHEN THE DISTANCE IS READ ON THE [illegible]

ERRATA.

[illegible] 6 + 8 × 2306 = 107.0 feet,

ERRATA

FOR

"TABLES SHOWING DIFFERENCE OF LEVEL, &C., FOR USE WITH STADIA, COMPUTED BY J. A. OCKERSON AND JARED TEEPLE, ASS'T ENG'RS U. S. LAKE SURVEY, DETROIT, MICHIGAN, 1879."

Page.	Column.	Line.				
		° ′				
8	60	0 45	For	7.59	read	2.59
8	70	0 52	"	4.49	"	3.49
15	190	1 13	"	12.24	"	13.24
16	260	1 46	"	26.24	"	26.29
21	150	2 18	"	20.08	"	21.08
22	210	2 58	"	55.63	"	35.63
62	7°	8	"	.0254	"	.0154

ENGINEER DEPARTMENT, U. S. A.

TABLES

SHOWING

DIFFERENCE OF LEVEL

IN FEET,

CORRESPONDING TO A GIVEN ANGLE, WHEN THE DISTANCE IS READ IN METRES OR FEET,

AND FOR

HORIZONTAL REDUCTIONS,

FOR USE WITH STADIA.

COMPUTED BY

J. A. OCKERSON and JARED TEEPLE,

Ass't Eng'rs U. S. Lake Survey, Detroit, Michigan.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

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NOTE.

The following formulæ, deduced by Professor S. W. Robinson, of the Illinois Industrial University, were used in the computation of these tables:

$$H = \frac{R'}{2R}(B - c - f)\ sin.\ 2\ V + (c + f)\ sin.\ V.$$

$$D = \frac{R'}{R}(B - c - f)\ cos.^2\ V + (c + f)\ cos.\ V.$$

R' = any reading of the stadia.

B = length of a measured base.

R = reading of stadia on the base.

V = angle of elevation or depression.

c = distance from centre of instrument to centre of object glass.

f = principal focal length of object glass.

$(c + f) = 0.43$ metres.

H = difference of level.

D = horizontal distance.

When V and R' are known, the value of H may be taken from the tables as follows:

Required the difference of level when $V = 4° 30'$ and $R' = 410$ metres. In the column headed 410 (page 35), and opposite $4° 30'$, in first column, we find 105.16 feet, which is the difference of level required.

If V is the same as before and $R' = 418$ metres, we would have, as the column headed D gives the difference for one metre,

$$H = 105.16 + 8 \times .2306 = 107.0 \text{ feet.}$$

Table II, on page 59, will give the difference of level in feet to the nearest tenth, by multiplying the difference for the

given angle by the distance in metres, and adding to the result the correction given in brackets at the bottom of the page.

EXAMPLE.—The difference for 4° 30′ from table is .2562 and ·2562 × 410 + 0.15 = 105.2 feet, the same as above.

This table may be used when the distance is greater than those for which Table I is computed.

HORIZONTAL REDUCTIONS.

Page 62 contains a table for use in obtaining the horizontal distance for any stadia reading having an elevation less than 30°.

EXAMPLE.—Required the reduction when $V = 7° 42'$ and $R' = 368$ metres.

From the column headed 7° and opposite 42′, we find .0180, which, multiplied by 368, gives 6.624, the reduction required, and the horizontal distance = 368 — 6.624 = 361.376.

When distances are read in feet they may be reduced to metres by Table V, on page 65, and the required quantities may be taken from the tables as before.

Table IV gives correction for curvature and refraction. When the angle is plus the correction should be added, and when the angle is minus subtract the correction.

MARKING STADIA BOARDS.

Without entering into a discussion of the theory of the stadia, an outline of the method of laying off and marking stadia boards is given below.

The metre will be used as the unit of measure in this discussion.

One of the most important things in stadia work is to have an instrument with a good telescope so that the marks on the board will be well defined at a distance of 400 metres on a clear day.

The cross-wires should be very fine and placed on either

side of the horizontal wire, parallel to it and equidistant from it, the distance between the extreme wires being such as to subtend an arc of about 28′.

The stadia boards should be of well-seasoned, clear pine, one inch thick, five inches wide, and fourteen feet long.

The bottom should be protected by an iron shoe, to keep the board from being split or battered. Before being marked they should receive sufficient coatings of white paint to make them thoroughly white.

Having made the above preparations the next thing is to select a place where a base line can be measured with a chain over smooth, even ground.

It should be carefully measured with a chain whose length is known, and stakes set at the end of each 100 metres.

The air should be clear and steady when the instrument is set up over one end of the base line and carefully levelled. Two targets are necessary. They may be made of bristol-board, with a black diamond painted on it, and having a narrow, horizontal slit along the centre line, through which to mark its position on the board. Fix one of these targets with thumb tacks near the bottom of the board. Then, having the board held *vertically* on the first 100 metre stake, set the lower wire on the fixed target and have the other target moved till it is cut by the upper wire. This gives one determination for the value of the space covered at a distance of 100 metres. Repeat this operation on the 200, 300, and 400 metre stakes, and check the whole work by going over the points the second time, using the mean of the two determinations if they differ by but a small amount. A large discrepancy will, of course, show that an error has been made.

It will be observed that the space covered at 200, 300, &c., metre stake will not be 2, 3, &c., times the space covered at the 100 metre stake, as the distance $c + f$ enters but once in each pointing. But inasmuch as it is necessary to read distances indiscriminately on all parts of the board, as intervening objects often prevent the observer from seeing the whole

board, it is best to distribute $c + f$, which is small, among the several determined distances.

Hence, take for the length of each 100 metre space the mean of all the 100 metre spaces determined. That is, add together the lengths of the 100, 200, &c., spaces, and divide by the number of 100 spaces determined. A little more weight should perhaps be given to the short distances as the targets are more distinct.

Having divided the board into 100 metre spaces, divide these again into 10, then by means of a card-board stencil the proper figures may be marked on the board in pencil, and it is then ready to be painted.

The kind of figures that are used are as numerous as the observers who use them. The correct principle to follow out is to keep the colors as much together as possible, or when the air is unsteady the figures will run together to such an extent that it will be impossible to distinguish them. Large figures, with points to indicate the smaller divisions, are better than small detached figures.

The figures should not be carried out to the edge of the board as there is danger of the board becoming bruised, thus breaking the outline of the figure.

Neither should there be a flange on the edges of the board to protect its face, for then the flanges, though projecting but little, will, in a certain light, cast a shadow on the face of the board and make it difficult to read.

A system of figures which have come into general use on the United States Lake Survey is given in the margin. It gives the best satisfaction of any of the many devices which have been tried.

With a good instrument and boards properly marked excellent work can be done. Under many circumstances it is even more accurate than chaining, and takes the place of the chain in many cases when the use of the latter is not practicable at all. It could

be used to good advantage in preliminary surveys for railroads as the cost and time required would be very much less than by the ordinary methods. One observer, with a theodolite, would take the place of transit-man and level-man, and instead of getting only a *section* of the line run over, the main topographical features for a distance of a quarter of a mile on each side of the line could also be determined.

Angle.	10	20	30	40	50	60	70	80	90	100	D
0° 0′	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	.001
2	0.02	0.04	0.06	0.08	0.10	0.12	0.13	0.15	0.17	0.19	.002
3	0.03	0.06	0.09	0.12	0.14	0.17	0.20	0.23	0.26	0.29	.003
4	0.04	0.08	0.12	0.15	0.19	0.23	0.27	0.31	0.34	0.38	.004
5	0.05	0.10	0.14	0.19	0.24	0.29	0.34	0.38	0.43	0.48	.005
6	0.06	0.12	0.17	0.23	0.29	0.35	0.40	0.46	0.52	0.57	.006
7	0.07	0.14	0.20	0.27	0.34	0.40	0.47	0.54	0.60	0.67	.007
8	0.08	0.16	0.23	0.31	0.38	0.46	0.54	0.61	0.69	0.77	.008
9	0.09	0.18	0.26	0.35	0.43	0.52	0.60	0.69	0.78	0.86	.009
10	0.10	0.19	0.29	0.38	0.48	0.58	0.67	0.77	0.86	0.96	.010
11	0.11	0.21	0.32	0.42	0.53	0.63	0.74	0.84	0.95	1.05	.010
12	0.12	0.23	0.35	0.46	0.58	0.69	0.81	0.92	1.03	1.15	.011
13	0.13	0.25	0.38	0.50	0.62	0.75	0.87	1.00	1.12	1.24	.012
14	0.14	0.27	0.41	0.54	0.67	0.81	0.94	1.07	1.21	1.34	.013
15	0.15	0.29	0.43	0.58	0.72	0.86	1.01	1.15	1.29	1.44	.014
16	0.16	0.31	0.46	0.62	0.77	0.92	1.07	1.23	1.38	1.53	.015
17	0.17	0.33	0.49	0.65	0.82	0.98	1.14	1.30	1.46	1.63	.016
18	0.18	0.35	0.52	0.69	0.86	1.04	1.21	1.38	1.55	1.72	.017
19	0.19	0.37	0.55	0.73	0.91	1.09	1.27	1.46	1.64	1.82	.018
20	0.20	0.39	0.58	0.77	0.96	1.15	1.34	1.53	1.72	1.91	.019
21	0.21	0.41	0.61	0.81	1.01	1.21	1.41	1.61	1.81	2.01	.020
22	0.22	0.43	0.64	0.85	1.06	1.27	1.48	1.69	1.90	2.10	.021
23	0.23	0.45	0.67	0.89	1.11	1.32	1.54	1.76	1.98	2.20	.022
24	0.24	0.47	0.70	0.92	1.15	1.38	1.61	1.84	2.07	2.30	.023
25	0.25	0.49	0.72	0.96	1.20	1.44	1.68	1.92	2.15	2.39	.024
26	0.26	0.51	0.75	1.00	1.25	1.50	1.74	1.99	2.24	2.49	.025
27	0.27	0.53	0.78	1.04	1.30	1.56	1.81	2.07	2.33	2.58	.026
28	0.28	0.54	0.81	1.08	1.35	1.61	1.88	2.15	2.41	2.68	.027
29	0.29	0.56	0.84	1.12	1.39	1.67	1.94	2.22	2.50	2.77	.028
30	0.30	0.58	0.87	1.15	1.44	1.73	2.01	2.30	2.58	2.87	.029
31	0.31	0.60	0.90	1.19	1.49	1.79	2.08	2.38	2.67	2.97	.029
32	0.32	0.62	0.93	1.23	1.54	1.84	2.15	2.45	2.76	3.06	.030
33	0.33	0.64	0.96	1.27	1.59	1.90	2.21	2.53	2.84	3.16	.031
34	0.34	0.66	0.99	1.31	1.63	1.96	2.28	2.61	2.93	3.25	.032
35	0.35	0.68	1.01	1.35	1.68	2.02	2.35	2.68	3.02	3.35	.033
36	0.36	0.70	1.04	1.39	1.73	2.07	2.42	2.76	3.10	3.44	.034
37	0.37	0.72	1.07	1.42	1.78	2.13	2.48	2.84	3.19	3.54	.035
38	0.38	0.74	1.10	1.46	1.83	2.19	2.55	2.91	3.27	3.64	.036
39	0.39	0.76	1.13	1.50	1.87	2.25	2.62	2.99	3.36	3.73	.037
40	0.40	0.78	1.16	1.54	1.92	2.30	2.68	3.07	3.45	3.83	.038
41	0.41	0.80	1.19	1.58	1.97	2.36	2.75	3.14	3.53	3.92	.039
42	0.42	0.82	1.22	1.62	2.02	2.42	2.82	3.22	3.62	4.02	.040
43	0.43	0.84	1.25	1.66	2.07	2.48	2.88	3.29	3.70	4.11	.041
44	0.44	0.86	1.28	1.69	2.11	2.53	2.95	3.37	3.79	4.21	.042
45	0.45	0.88	1.30	1.73	2.16	7.59	3.02	3.45	3.88	4.31	.043
46	0.46	0.90	1.33	1.77	2.21	2.65	3.09	3.52	3.96	4.40	.044
47	0.47	0.91	1.36	1.81	2.26	2.71	3.15	3.60	4.05	4.50	.045
48	0.48	0.93	1.39	1.85	2.31	2.76	3.22	3.68	4.14	4.59	.046
49	0.49	0.95	1.42	1.89	2.35	2.82	3.29	3.75	4.22	4.69	.047
50	0.50	0.97	1.45	1.92	2.40	2.88	3.35	3.83	4.31	4.78	.048
51	0.51	0.99	1.48	1.96	2.45	2.94	3.42	3.91	4.39	4.88	.049
52	0.52	1.01	1.51	2.00	2.50	2.99	4.49	3.98	4.48	4.97	.049
53	0.53	1.03	1.54	2.04	2.55	3.05	3.56	4.06	4.57	5.07	.050
54	0.54	1.05	1.57	2.08	2.59	3.11	3.62	4.14	4.65	5.17	.051
55	0.55	1.07	1.59	2.12	2.64	3.17	3.69	4.21	4.74	5.26	.052
56	0.56	1.09	1.62	2.16	2.69	3.22	3.76	4.29	4.82	5.36	.053
57	0.57	1.11	1.65	2.19	2.74	3.28	3.82	4.37	4.91	5.45	.054
58	0.58	1.13	1.68	2.23	2.79	3.34	3.89	4.44	5.00	5.55	.055
59	0.59	1.15	1.71	2.27	2.83	3.40	3.96	4.52	5.08	5.64	.056
60	0.60	1.17	1.74	2.31	2.88	3.45	4.03	4.60	5.17	5.74	.057

Angle.	110	120	130	140	150	160	170	180	190	200	D
0° 0′	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	0.11	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	.001
2	0.21	0.23	0.25	0.27	0.29	0.31	0.32	0.34	0.36	0.38	.002
3	0.32	0.34	0.37	0.40	0.43	0.46	0.49	0.52	0.54	0.57	.003
4	0.42	0.46	0.50	0.54	0.57	0.61	0.65	0.69	0.73	0.76	.004
5	0.53	0.57	0.62	0.67	0.72	0.76	0.81	0.86	0.91	0.95	.005
6	0.63	0.69	0.75	0.80	0.86	0.92	0.97	1.03	1.09	1.15	.006
7	0.74	0.80	0.87	0.94	1.00	1.07	1.14	1.20	1.27	1.34	.007
8	0.84	0.92	0.99	1.07	1.15	1.22	1.30	1.38	1.45	1.53	.008
9	0.95	1.03	1.12	1.20	1.29	1.38	1.46	1.55	1.63	1.72	.009
10	1.05	1.15	1.24	1.34	1.43	1.53	1.62	1.72	1.81	1.91	.010
11	1.16	1.26	1.37	1.47	1.58	1.68	1.79	1.89	2.00	2.10	.010
12	1.26	1.38	1.49	1.61	1.72	1.83	1.95	2.06	2.18	2.29	.011
13	1.37	1.49	1.62	1.74	1.86	1.99	2.11	2.23	2.36	2.48	.012
14	1.47	1.61	1.74	1.87	2.01	2.14	2.27	2.41	2.54	2.67	.013
15	1.58	1.72	1.86	2.01	2.15	2.29	2.44	2.58	2.72	2.86	.014
16	1.68	1.84	1.99	2.14	2.29	2.45	2.60	2.75	2.90	3.06	.015
17	1.79	1.95	2.11	2.27	2.44	2.60	2.76	2.92	3.08	3.25	.016
18	1.89	2.07	2.24	2.41	2.58	2.75	2 92	3.09	3.27	3.44	.017
19	2.00	2.18	2.36	2.54	2.72	2.90	3.09	3.27	3.45	3.63	.018
20	2.10	2.29	2.49	2.68	2.87	3.06	3.25	3.44	3.63	3.82	.019
21	2.21	2.41	2.61	2.81	3.01	3.21	3.41	3.61	3.81	4.01	.020
22	2.31	2.52	2.73	2.94	3.15	3.36	3.57	3.78	3.99	4.20	.021
23	2.42	2.64	2.86	3.08	3.30	3.52	3.73	3.95	4.17	4.39	.022
24	2.52	2.75	2.98	3.21	3.44	3.67	3.90	4.13	4.35	4.58	.023
25	2.63	2.87	3.11	3.34	3.58	3.82	4.06	4.30	4.54	4.77	.024
26	2.74	2.98	3.23	3.48	3.73	3.97	4.22	4.47	4.72	4.97	.025
27	2.84	3.10	3.36	3.61	3.87	4.13	4.38	4.64	4.90	5.16	.026
28	2.95	3.21	3.48	3.75	4.01	4.28	4.55	4.81	5.08	5.35	.027
29	3.05	3.33	3.60	3.88	4.16	4.43	4.71	4.99	5.26	5.54	.028
30	3.16	3.44	3.73	4.01	4.30	4.59	4.87	5.16	5.44	5.73	.029
31	3.26	3.56	3.85	4.15	4.44	4.74	5.03	5.33	5.62	5.92	.029
32	3.37	3.67	3.98	4.28	4.59	4.89	5.20	5.50	5.81	6.11	.030
33	3.47	3.79	4.10	4.42	4.73	5.04	5.36	5.67	5.99	6.30	.031
34	3.58	3.90	4.23	4.55	4.87	5.20	5.52	5.84	6.17	6.49	.032
35	3.68	4.02	4.35	4.68	5.02	5.35	5.68	6.02	6.35	6.68	.033
36	3.79	4.13	4.47	4.82	5.16	5.50	5.85	6.19	6.53	6.87	.034
37	3.89	4.25	4.60	4.95	5.30	5.66	6.01	6.36	6.71	7.07	.035
38	4.00	4.36	4.72	5.08	5.45	5.81	6.17	6.53	6.89	7.26	.036
39	4.10	4.47	4.85	5.22	5.59	5.96	6.33	6.70	7.08	7.45	.037
40	4.21	4.59	4.97	5.35	5.73	6.11	6.50	6.88	7.26	7.64	.038
41	4.31	4.70	5.10	5.49	5.88	6.27	6.66	7.05	7.44	7.83	.039
42	4.42	4.82	5.22	5.62	6.02	6.42	6.82	7.22	7.62	8.02	.040
43	4.52	4.93	5 34	5.75	6.16	6.57	6.98	7.39	7.80	8.21	.041
44	4.63	5.05	5.47	5.89	6.31	6.73	7.15	7.56	7.98	8.40	.042
45	4.73	5.16	5.59	6.02	6.45	6.88	7.31	7.74	8.16	8.59	.043
46	4.84	5.28	5.72	6.15	6.59	7.03	7.47	7.91	8.35	8.78	.044
47	4.94	5.39	5.84	6.29	6.74	7.18	7.63	8.08	8.53	8.98	.045
48	5.05	5.51	5.96	6.42	6.88	7.34	7.79	8.25	8.71	9.17	.046
49	5.15	5.62	6.09	6.56	7.02	7.49	7.96	8.42	8.89	9.36	.047
50	5.26	5.74	6.21	6.69	7.17	7.64	8.12	8.59	9.07	9.55	.048
51	5.37	5.85	6.34	6.82	7.31	7.80	8.28	8.77	9.25	9.74	.049
52	5.47	5.97	6.46	6.96	7.45	7.95	8.44	8.94	9.43	9.93	.049
53	5.58	6.08	6.59	7.09	7.60	8.10	8.61	9.11	9.62	10.12	.050
54	5.68	6.20	6.71	7.23	7.74	8.25	8.77	9.28	9.80	10.31	.051
55	5.79	6.31	6.83	7.36	7.88	8.41	8.93	9.45	9.98	10.50	.052
56	5.89	6.43	6.96	7.49	8.03	8.56	9.09	9.63	10.16	10.69	.053
57	6.00	6.54	7.08	7.63	8.17	8.71	9.26	9.80	10.34	10.89	.054
58	6.10	6.65	7.21	7.76	8.31	8.87	9.42	9.97	10.52	11.08	.055
59	6.21	6.77	7.33	7.89	8.46	9.02	9.58	10.14	10.70	11.27	.056
60	6.31	6.88	7.46	8.03	8.60	9.17	9.74	10.31	10.89	11.46	.057

Angle.	210	220	230	240	250	260	270	280	290	300	D
0° 0′	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.000
1	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	.001
2	0.40	0.42	0.44	0.46	0.48	0.50	0.52	0.53	0.55	0.57	.002
3	0.60	0.63	0.66	0.69	0.72	0.74	0.77	0.80	0.83	0.86	.003
4	0.80	0.84	0.88	0.92	0.95	0.99	1.03	1.07	1.11	1.14	.004
5	1.00	1.05	1.10	1.15	1.19	1.24	1.29	1.34	1.38	1.43	.005
6	1.20	1.26	1.32	1.37	1.43	1.49	1.55	1.60	1.66	1.72	.006
7	1.40	1.47	1.54	1.60	1.67	1.74	1.80	1.87	1.94	2.00	.007
8	1.60	1.68	1.76	1.83	1.91	1.99	2 06	2.14	2.21	2.29	.008
9	1.80	1.89	1.98	2.06	2.15	2.23	2.32	2.40	2.49	2.58	.009
10	2.00	2.10	2.20	2.29	2.39	2.48	2.57	2.67	2.77	2.86	.010
11	2.21	2.31	2.42	2.52	2.62	2.73	2.83	2.94	3.04	3.15	.010
12	2.41	2.52	2.64	2.75	2.86	2.98	3.09	3.21	3.32	3.43	.011
13	2.61	2.73	2.85	2.98	3.10	3.23	3.35	3.47	3.60	3.72	.012
14	2.81	2.94	3.07	3.21	3.34	3.47	3.61	3.74	3.87	4.01	.013
15	3.01	3.15	3.29	3.44	3.58	3.72	3.86	4.01	4.15	4.29	.014
16	3.21	3.36	3.51	3.67	3.82	3.97	4.12	4.28	4.43	4.58	.015
17	3.41	3.57	3.73	3.89	4.06	4.22	4.38	4.54	4.70	4.87	.016
18	3.61	3.78	3.95	4.12	4.29	4.47	4.64	4.81	4.98	5.15	.017
19	3.81	3.99	4.17	4.35	4.53	4.71	4.90	5.08	5.26	5.44	.018
20	4.01	4.20	4.39	4.58	4.77	4.96	5.15	5.34	5.54	5.73	.019
21	4.21	4.41	4.61	4.81	5.01	5.21	5.41	5.61	5.81	6.01	.020
22	4.41	4.62	4.83	5.04	5.25	5.46	5.67	5.88	6.09	6.30	.021
23	4.61	4.83	5.05	5.27	5.49	5.71	5.93	6.15	6.37	6.58	.022
24	4.81	5.04	5.27	5.50	5.73	5.96	6.18	6.41	6.64	6.87	.023
25	5.01	5.25	5.49	5.73	5.96	6.20	6.44	6.68	6.92	7.16	.024
26	5.21	5.46	5.71	5.96	6.20	6.45	6.70	6.95	7.20	7.44	.025
27	5.41	5.67	5.93	6.19	6.44	6.70	6.96	7.21	7.47	7.73	.026
28	5.61	5.88	6.15	6.41	6.68	6.95	7.21	7.48	7.75	8.01	.027
29	5.81	6.09	6.37	6.64	6.92	7.20	7.47	7.75	8'03	8.30	.028
30	6.01	6.30	6.59	6.87	7.16	7.44	7.73	8.02	8.30	8.59	.029
31	6.22	6.51	6.81	7.10	7.40	7.69	7.99	8.28	8.58	8'87	.029
32	6.42	6.72	7.03	7.33	7.64	7.94	8.25	8.55	8.86	9.16	.030
33	6.62	6.93	7.25	7.56	7.87	8.19	8.50	8.82	9.13	9.45	.031
34	6.82	7.14	7.47	7.79	8.11	8.44	8.76	9.08	9.41	9.73	.032
35	7.02	7.35	7.69	8.02	8.35	8.69	9.02	9.35	9.69	10.02	.033
36	7.22	7.56	7.91	8.25	8.59	8.93	9.28	9.62	9.96	10.30	.034
37	7.42	7.77	8.13	8.48	8.83	9.18	9.53	9.89	10.24	10.59	.035
38	7.62	7.98	8.34	8.71	9.07	9.43	9.79	10.15	10.52	10.88	.036
39	7.82	8.19	8.56	8.93	9.31	9.68	10.05	10.42	10.79	11.16	.037
40	8.02	8.40	8.78	9.16	9.54	9.93	10.31	10.69	11.07	11.45	.038
41	8.22	8.61	9.00	9.39	9.78	10.17	10.56	10.96	11.35	11.74	.039
42	8.42	8.82	9.22	9.62	10.02	10.42	10.82	11.22	11.62	12.02	.040
43	8.62	9.03	9.44	9.85	10.26	10.67	11.08	11.49	11.90	12.31	.041
44	8.82	9.24	9.66	10.08	10.50	10.92	11.34	11.76	12.18	12.59	.042
45	9.02	9.45	9.88	10.31	10.74	11.17	11.59	12.02	12.45	12.88	.043
46	9.22	9.66	10.10	10.54	10.98	11.41	11.85	12.29	12.73	13.17	.044
47	9.42	9.87	10.32	10.77	11.21	11.66	12.11	12.56	13.01	13.45	.045
48	9.62	10.08	10.54	11.00	11.45	11.91	12.37	12.83	13.28	13.74	.046
49	9.82	10.29	10.76	11.23	11.69	12.16	12.63	13.0,	13.56	14.03	.047
50	10.02	10.50	10.98	11.45	11.93	12.41	12.88	13.36	13.84	14.31	.048
51	10.23	10.71	11.20	11.68	12.17	12.66	13.14	13.63	14.11	14.60	.049
52	10.43	10.92	11.42	11.91	12.41	12.90	13.40	13.89	14.39	14.88	.049
53	10.63	11.13	11.64	12.14	12.65	13.15	13.66	14.16	14.67	15.17	.050
54	10.83	11.34	11.86	12.37	12.88	13.40	13.91	14.43	14.94	15.46	.051
55	11.03	11.55	12.08	12.60	13.12	13.65	14.17	14.70	15.22	15.74	.052
56	11.23	11.76	12.30	12.83	13.36	13.90	14.43	14.96	15.50	16.03	.053
57	11.43	11.97	12.51	13.06	13.60	14.14	14.69	15.23	15.77	16.32	.034
58	11.63	12.18	12.73	13.29	13.84	14.39	14.94	15.50	16.05	16.60	.055
59	11.83	12.39	12.95	13.52	14.08	14.64	15.20	15.76	16.33	16.89	.056
60	12.03	12.60	13.17	13.75	14.32	14.89	15.46	16.03	16.62	17.18	.057

Angle.	316	225	230	315	231	135	171	45	230	206	D
0° 0′	0.00	1.00	1.00	1.00	1	1.00	1.00	1.00	1.00	1	
1	0.30	1	1	1	1	1	1	1	1	1	
2	0.59	1.00	1	1	1	1	1	1	1	1	
3	0.89	1.00	1.00	1	1	1	1	1	1	1	
4	1.19	1	1	1	1	1	1	1	1	1	
5	1	1	1	1	1	1	1	1	1	1	
6	1	1	1	1	1	1	1	1	1	1	
7	1.19	1	1.00	1	1	1	1	1	1	1	
8	1.19	1	1	1	1	1	1	1	1	1	
9	1.19	1	1	1	1	1	1	1	1	1	
10	1.38	1.00	1	1	1	1	1	1	1	1	
11	1	1	1	1	1	1	1	1	1	1	
12	1	1	1	1	1	1	1	1	1	1	
13	1	1	1	1	1	1	1	1	1	1	
14	1.38	1	1	1	1	1	1	1	1	1	
15	1.48	1	1	1	1	1	1	1	1	1	
16	1	1	1	1	1	1	1	1	1	1	
17	1	1	1	1	1	1	1	1	1	1	
18	1	1	1	1	1	1	1	1	1	1	
19	1	1	1	1	1	1	1	1	1	1	
20	1	1	1	1	1	1	1	1	1	1	
21	1	1	1	1	1	1	1	1	1	1	
22	1	1	1	1	1	1	1	1	1	1	
23	1	1	1	1	1	1	1	1	1	1	
24	1	1	1	1	1	1	1	1	1	1	
25	1	1	1	1	1	1	1	1	1	1	
26	1	1	1	1	1	1	1	1	1	1	
27	1	1	1	1	1	1	1	1	1	1	
28	1	1	1	1	1	1	1	1	1	1	
29	1	1	1	1	1	1	1	1	1	1	
30	1.15	1	1.00	1	1	1	1	1	1	1	
31	1	1	1	1	1	1	1	1	1	1	
32	1	1	1	1	1	1	1	1	1	1	
33	1	1	1	1	1	1	1	1	1	1	
34	1	1	1	1	1	1	1	1	1	1	
35	1	1	1	1	1	1	1	1	1	1	
36	1	1	1	1	1	1	1	1	1	1	
37	1	1	1	1	1	1	1	1	1	1	
38	1.24	1	1	1	1	1	1	1	1	1	
39	1	1	1	1	1	1	1	1	1	1	
40	1	1	1	1	1	1	1	1	1	1	
41	1	1	1	1	1	1	1	1	1	1	
42	1	1	1	1	1	1	1	1	1	1	
43	1	1	1	1	1	1	1	1	1	1	
44	1	1	1	1	1	1	1	1	1	1	
45	1	1	1	1	1	1	1	1	1	1	
46	1	1	1	1	1	1	1	1	1	1	
47	1	1	1	1	1	1	1	1	1	1	
48	1	1	1	1	1	1	1	1	1	1	
49	1	1	1	1	1	1	1	1	1	1	
50	1	1	1	1	1	1	1	1	1	1	
51	1	1	1	1	1	1	1	1	1	1	
52	1	1	1	1	1	1	1	1	1	1	
53	1	1	1	1	1	1	1	1	1	1	
54	1	1	1	1	1	1	1	1	1	1	
55	1	1	1	1	1	1	1	1	1	1	
56	1	1	1	1	1	1	1	1	1	1	
57	1	1	1	1	1	1	1	1	1	1	
58	1	1	1	1	1	1	1	1	1	1	
59	1	1	1	1	1	1	1	1	1	1	
60	1	1	1	1	1	1	1	1	1	1	

Angle.	410	420	430	440	450	460	470	480	490	500	D
0° 0′	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	.001
2	0.78	0.80	0.82	0.84	0.86	0.88	0.90	0.92	0.93	0.95	.002
3	1.17	1.20	1.23	1.26	1.29	1.32	1.34	1.37	1.40	1.43	.003
4	1.56	1.60	1.64	1.68	1.72	1.75	1.79	1.83	1.87	1.91	.004
5	1.96	2.00	2.05	2.10	2.15	2.19	2.24	2.29	2 34	2.38	.005
6	2.35	2.40	2.46	2.52	2.57	2.63	2.69	2.75	2.80	2.86	.006
7	2.74	2.80	2.87	2.94	3.00	3.07	3.14	3.20	3.27	3.34	.007
8	3.13	3.20	3.28	3.36	3.43	3.51	3.59	3.66	3.74	3.81	.008
9	3.52	3.60	3.69	3.78	3.86	3.95	4.03	4.12	4.21	4.29	.009
10	3.91	4.01	4.10	4.20	4.29	4.39	4.48	4.58	4.67	4.77	.010
11	4.30	4.41	4.51	4.62	4.72	4.83	4.93	5.04	5.14	5.24	.010
12	4.69	4.81	4.92	5.03	5.15	5.26	5.38	5.49	5.61	5.72	.011
13	5.08	5.21	5.33	5.45	5.58	5.70	5.83	5 95	6.08	6.20	.012
14	5.47	5.61	5.74	5.87	6.01	6.14	6.27	6.41	6.54	6.68	.013
15	5.87	6.01	6.15	6.29	6.44	6.58	6.72	6.87	7.01	7.15	.014
16	6.26	6.41	6.56	6.71	6.87	7.02	7.17	7.32	7 48	7.63	.015
17	6.65	6.81	6.97	7.13	7.29	7.46	7.62	7.78	7.94	8.11	.016
18	7.04	7.21	7.38	7.55	7.72	7.90	8.07	8.24	8.41	8.58	.017
19	7.43	7.61	7.79	7.97	8.15	8.34	8.52	8 70	8.88	9.06	.018
20	7.82	8.01	8.20	8.39	8.58	8.77	8.97	9.16	9.35	9.54	.019
21	8.21	8.41	8.61	8.81	9.01	9.21	9.41	9.61	9.81	10.01	.020
22	8.60	8.81	9.02	9.23	9.44	9.65	9.86	10.07	10.28	10.49	.021
23	8.99	9.21	9.43	9.65	9.87	10.09	10.31	10.53	10 75	10.97	.022
24	9.38	9.61	9.84	10.07	10.30	10.53	10.76	10.99	11.22	11.44	.023
25	9.78	10.02	10.25	10.49	10.73	10.97	11.21	11.44	11.68	11.92	.024
26	10.17	10.42	10.66	10.91	11.16	11.41	11.65	11.90	12.15	12.40	.025
27	10.56	10.82	11.07	11.33	11.59	11.84	12.10	12.36	12.62	12.87	.026
28	10.95	11.22	11.48	11.75	12.01	12.28	12.55	12.82	13.08	13.35	.027
29	11.34	11.62	11.89	12.17	12.44	12.72	13.00	13.28	13.55	13.83	.028
30	11.73	12.02	12.30	12.59	12.87	13.16	13.45	13.73	14.02	14.30	.029
31	12.12	12.42	12.71	13.01	13.30	13.60	13.90	14.19	14.49	14.78	.029
32	12.51	12.82	13.12	13.43	13.73	14.04	14.34	14.65	14.95	15.26	.030
33	12.90	13.22	13.53	13.85	14.16	14.48	14.79	15.11	15.42	15.73	.031
34	13 29	13.62	13.94	14.27	14.59	14.92	15.24	15.56	15.89	16.21	.032
35	13.69	14.02	14.35	14.69	15.02	15.35	15.69	16.02	16.36	16.69	.033
36	14.08	14.42	14.76	15.11	15.45	15.79	16.14	16 48	16.82	17.16	.034
37	14.47	14.82	15.17	15.53	15.88	16.23	16.58	16.94	17.29	17.64	.035
38	14.86	15.22	15.58	15.94	16.31	16.67	17.03	17.40	17.76	18.12	.036
39	15.25	15.62	15.99	16.36	16.73	17.11	17.48	17.85	18.22	18.60	.037
40	15.64	16.02	16.40	16.78	17.16	17.55	17.93	18.31	18.69	19.07	.038
41	16.03	16.42	16.81	17.20	17.59	17.99	18.38	18.77	19.16	19.55	.039
42	16.42	16.82	17.22	17.62	18.02	18.43	18.83	19.23	19.63	20.03	.040
43	16.81	17.22	17.63	18.04	18.45	18.86	19.27	19.68	20.11	20.50	.041
44	17.20	17.63	18.04	18.46	18.88	19.30	19.72	20.14	20.56	20.98	.042
45	17.60	18.03	18.45	18.88	19.31	19.74	20.17	20.60	21.03	21.46	.043
46	17.99	18.43	18.86	19.30	19.74	20.18	20.62	21.06	21.50	21.93	.044
47	18.38	18.83	19.27	19.72	20.17	20.62	21.07	21.51	21.96	22.41	.045
48	18.77	19.23	19.68	20.14	20.60	21.06	21.52	21.97	22.43	22.89	.046
49	19.16	19.63	20.09	20.56	21.03	21.50	21.96	22.43	22.90	23.36	.047
50	19.55	20.03	20.51	20.98	21.46	21.94	22.41	22.89	23.37	23.84	.048
51	19.94	20.43	20.92	21.40	21.88	22.37	22.86	23.35	23.83	24.32	.049
52	20.33	20.83	21.33	21.82	22.31	22.81	23.31	23.80	24.30	24.79	.049
53	20.72	21.23	21.74	22.24	22.74	23.25	23 76	24.26	24.77	25.27	.050
54	21.11	21.63	22.15	22.66	23.17	23.69	24.20	24.72	25.24	25.75	.051
55	21.51	22.03	22.56	23.08	23.60	24.13	24.65	25.18	25.70	26.22	.052
56	21.90	22.43	22.97	23.50	24.03	24.57	25.10	25.63	26.17	26.70	.053
57	22.29	22.83	23.38	23.92	24.46	25.01	25.55	26.09	26.64	27.18	.054
58	22.68	23.23	23.79	24.34	24.89	25.44	26.00	26.55	27.10	27.65	.055
59	23.07	23.64	24.20	24.76	25.32	25.88	26.45	27.01	27.57	28.13	.056
60	23.46	24.04	24.61	25.18	25.75	26.32	26.89	27.47	28.04	28.61	.057

Angle.	510	520	530	540	550	560	570	580	590	600	D
0° 0′	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0.00	0.00	0.00	
1	0.49	0.50	0.51	0.51	0.52	0.53	0.54	0.55	0.56	0.57	.001
2	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.11	1.12	1.14	.002
3	1.46	1.49	1.52	1.54	1.57	1.60	1.63	1.66	1.69	1.72	.003
4	1.95	1.98	2.02	2.06	2.10	2.14	2.17	2.21	2.25	2.29	.004
5	2.43	2.48	2.53	2.57	2.62	2.67	2.72	2.76	2.81	2.86	.005
6	2.92	2.98	3.03	3.09	3.15	3.20	3.26	3.32	3.38	3.43	.006
7	3.40	3.47	3.54	3.60	3.67	3.74	3.81	3.87	3.94	4.00	.007
8	3.89	3.97	4.05	4.12	4.20	4.27	4.35	4.42	4.50	4.57	.008
9	4.38	4.46	4.55	4.63	4.72	4.81	4.90	4.97	5.06	5.15	.009
10	4.86	4.96	5.05	5.15	5.24	5.34	5.44	5.53	5.63	5.72	.010
11	5.35	5.45	5.56	5.66	5.77	5.87	5.98	6.08	6.19	6.29	.010
12	5.84	5.95	6.06	6.18	6.29	6.41	6.53	6.64	6.75	6.86	.011
13	6.32	6.45	6.57	6.69	6.82	6.94	7.07	7.19	7.31	7.43	.012
14	6.81	6.94	7.08	7.21	7.34	7.48	7.62	7.74	7.88	8.01	.013
15	7.29	7.44	7.58	7.72	7.87	8.01	8.16	8.29	8.44	8.58	.014
16	7.78	7.93	8.09	8.24	8.39	8.54	8.70	8.85	9.00	9.15	.015
17	8.27	8.43	8.59	8.75	8.92	9.08	9.25	9.40	9.56	9.72	.016
18	8.75	8.93	9.10	9.27	9.44	9.61	9.79	9.95	10.13	10.29	.017
19	9.24	9.42	9.60	9.78	9.96	10.15	10.34	10.51	10.69	10.87	.018
20	9.73	9.92	10.11	10.30	10.49	10.68	10.88	11.06	11.25	11.44	.019
21	10.21	10.41	10.61	10.81	11.01	11.21	11.42	11.61	11.81	12.01	.020
22	10.70	10.91	11.12	11.33	11.54	11.75	11.97	12.17	12.38	12.58	.021
23	11.19	11.40	11.62	11.84	12.06	12.28	12.51	12.72	12.94	13.15	.022
24	11.67	11.90	12.13	12.36	12.59	12.82	13.05	13.27	13.50	13.73	.023
25	12.16	12.40	12.63	12.87	13.11	13.35	13.59	13.82	14.06	14.30	.024
26	12.64	12.89	13.14	13.39	13.64	13.88	14.14	14.38	14.63	14.87	.025
27	13.13	13.39	13.65	13.90	14.16	14.42	14.68	14.93	15.19	15.44	.026
28	13.62	13.88	14.15	14.42	14.68	14.95	15.23	15.48	15.74	16.01	.027
29	14.10	14.38	14.66	14.93	15.21	15.49	15.77	16.03	16.30	16.59	.028
30	14.59	14.88	15.16	15.45	15.73	16.02	16.31	16.59	16.87	17.16	.029
31	15.08	15.37	15.67	15.96	16.26	16.55	16.85	17.14	17.43	17.73	.029
32	15.56	15.87	16.17	16.48	16.78	17.09	17.40	17.70	17.99	18.30	.030
33	16.05	16.36	16.68	16.99	17.31	17.62	17.94	18.25	18.55	18.88	.031
34	16.54	16.86	17.18	17.51	17.83	18.16	18.49	18.80	19.12	19.46	.032
35	17.02	17.35	17.69	18.02	18.36	18.69	19.03	19.35	19.68	20.03	.033
36	17.51	17.85	18.19	18.54	18.88	19.22	19.55	19.91	20.24	20.60	.034
37	18.00	18.35	18.70	19.05	19.40	19.76	20.12	20.46	20.81	21.17	.035
38	18.48	18.84	19.21	19.57	19.93	20.29	20.66	21.01	21.37	21.74	.036
39	18.97	19.34	19.71	20.08	20.45	20.83	21.21	21.57	21.93	22.32	.037
40	19.46	19.83	20.22	20.60	20.98	21.36	21.75	22.12	22.49	22.89	.038
41	19.94	20.33	20.72	21.11	21.50	21.89	22.29	22.67	23.06	23.46	.039
42	20.43	20.83	21.23	21.63	22.03	22.43	22.84	23.23	23.62	24.03	.040
43	20.91	21.32	21.73	22.14	22.55	22.96	23.38	23.78	24.18	24.60	.041
44	21.40	21.82	22.24	22.66	23.08	23.50	23.92	24.33	24.74	25.17	.042
45	21.89	22.31	22.74	23.17	23.60	24.03	24.46	24.88	25.31	25.75	.043
46	22.37	22.81	23.25	23.69	24.12	24.56	25.01	25.44	25.87	26.32	.044
47	22.86	23.30	23.75	24.20	24.65	25.10	25.55	25.99	26.43	26.89	.045
48	23.35	23.80	24.26	24.72	25.17	25.63	26.10	26.54	26.99	27.46	.046
49	23.83	24.30	24.76	25.23	25.70	26.17	26.64	27.10	27.56	28.04	.047
50	24.32	24.79	25.27	25.75	26.22	26.70	27.18	27.65	28.12	28.61	.048
51	24.80	25.29	25.78	26.26	26.75	27.23	27.72	28.20	28.68	29.18	.049
52	25.29	25.78	26.28	26.78	27.27	27.77	28.27	28.76	29.24	29.75	.049
53	25.78	26.28	26.79	27.29	27.80	28.30	28.81	29.31	29.81	30.32	.050
54	26.26	26.78	27.29	27.81	28.32	28.84	29.36	29.86	30.37	30.90	.051
55	26.75	27.27	27.80	28.32	28.84	29.37	29.90	30.41	30.93	31.47	.052
56	27.24	27.77	28.30	28.84	29.37	29.90	30.45	30.97	31.49	32.04	.053
57	27.72	28.26	28.81	29.35	29.89	30.44	30.99	31.52	32.06	32.61	.054
58	28.21	28.75	29.31	29.87	30.42	30.97	31.53	32.07	32.62	33.18	.055
59	28.70	29.25	29.82	30.38	30.94	31.51	32.08	32.63	33.18	33.75	.056
60	29.18	29.75	30.32	30.90	31.47	32.04	32.61	33.18	33.75	34.33	.057

Angle.	10	20	30	40	50	60	70	80	90	100	D
1° 0′	0.60	1.17	1.74	2.31	2.88	3.45	4.03	4.60	5.17	5.74	.057
1	0.61	1.19	1.77	2.35	2.93	3.51	4.09	4.67	5.26	5.84	.058
2	0.62	1.21	1.80	2.39	2.98	3.57	4.16	4.75	5.34	5.93	.059
3	0.63	1.23	1.83	2.43	3.03	3.63	4.23	4.83	5.43	6.03	.060
4	0.64	1.25	1.86	2.47	3.07	3.68	4.29	4.90	5.51	6.12	.061
5	0.65	1.27	1.88	2.50	3.12	3.74	4.36	4.98	5.60	6.22	.062
6	0.66	1.28	1.91	2.54	3.17	3.80	4.43	5.06	5.69	6.31	.063
7	0.67	1.30	1.94	2.58	3.22	3.86	4.50	5.13	5.77	6.41	.064
8	0.68	1.32	1.97	2.62	3.27	3.91	4.56	5.21	5.86	6.51	.065
9	0.69	1.34	2.00	2.66	3.31	3.97	4.63	5.29	5.94	6.60	.066
10	0.70	1.36	2.03	2.70	3.36	4.03	4.70	5.36	6.03	6.70	.067
11	0.71	1.38	2.06	2.73	3.41	4.09	4.76	5.44	6.12	6.79	.068
12	0.72	1.40	2.09	2.77	3.46	4.14	4.83	5.52	6.20	6.89	.069
13	0.73	1.42	2.12	2.81	3.51	4.20	4.90	5.59	6.29	6.98	.070
14	0.73	1.44	2.14	2.85	3.55	4.26	4.96	5.67	6.37	7.08	.070
15	0.74	1.46	2.17	2.89	3.60	4.32	5.03	5.75	6.46	7.17	.071
16	0.75	1.48	2.20	2.93	3.65	4.37	5.10	5.82	6.55	7.27	.072
17	0.76	1.50	2.23	2.97	3.70	4.43	5.16	5.90	6.63	7.37	.073
18	0.77	1.52	2.26	3.00	3.75	4.49	5.22	5.96	6.72	7.46	.074
19	0.78	1.54	2.29	3.04	3.80	4.55	5.29	6.05	6.81	7.56	.075
20	0.79	1.56	2.32	3.08	3.84	4.60	5.36	6.13	6.89	7.65	.076
21	0.80	1.58	2.35	3.12	3.89	4.66	5.42	6.21	6.98	7.75	.077
22	0.81	1.60	2.38	3.16	3.94	4.72	5.49	6.28	7.06	7.84	.078
23	0.82	1.61	2.41	3.20	3.99	4.78	5.56	6.36	7.15	7.94	.079
24	0.83	1.63	2.43	3.24	4.03	4.83	5.63	6.44	7.24	8.04	.080
25	0.84	1.65	2.46	3.27	4.08	4.89	5.69	6.51	7.32	8.13	.081
26	0.85	1.67	2.49	3.31	4.13	4.95	5.76	6.59	7.41	8.23	.082
27	0.86	1.69	2.52	3.35	4.18	5.01	5.83	6.66	7.49	8.32	.083
28	0.87	1.71	2.55	3.39	4.23	5.06	5.89	6.74	7.58	8.42	.084
29	0.88	1.73	2.58	3.43	4.27	5.12	5.96	6.82	7.67	8.51	.085
30	0.89	1.75	2.61	3.47	4.32	5.18	6.03	6.89	7.75	8.61	.086
31	0.90	1.77	2.64	3.50	4.37	5.24	6.10	6.97	7.84	8.70	.087
32	0.91	1.79	2.67	3.54	4.42	5.29	6.16	7.05	7.92	8.80	.088
33	0.92	1.81	2.69	3.58	4.47	5.35	6.23	7.12	8.01	8.90	.089
34	0.93	1.83	2.72	3.62	4.51	5.41	6.30	7.20	8.10	8.99	.090
35	0.94	1.85	2.75	3.66	4.56	5.47	6.36	7.28	8.18	9.10	.090
36	0.95	1.87	2.78	3.70	4.61	5.52	6.43	7.35	8.27	9.18	.091
37	0.96	1.89	2.81	3.74	4.66	5.58	6.50	7.43	8.35	9.28	.092
38	0.97	1.91	2.84	3.77	4.71	5.64	6.57	7.51	8.44	9.37	.093
39	0.98	1.93	2.87	3.81	4.75	5.70	6.63	7.58	8.53	9.47	.094
40	0.99	1.95	2.90	3.85	4.80	5.76	6.70	7.66	8.61	9.56	.095
41	1.00	1.96	2.93	3.89	4.85	5.81	6.77	7.74	8.70	9.66	.096
42	1.01	1.98	2.96	3.93	4.90	5.87	6.83	7.81	8.78	9.76	.097
43	1.02	2.00	2.98	3.97	4.95	5.93	6.90	7.89	8.87	9.85	.098
44	1.03	2.02	3.01	4.00	4.99	5.99	6.97	7.97	8.96	9.95	.099
45	1.04	2.04	3.04	4.04	5.04	6.04	7.03	8.04	9.04	10.04	.100
46	1.05	2.06	3.07	4.08	5.09	6.10	7.10	8.12	9.13	10.14	.101
47	1.06	2.08	3.10	4.12	5.14	6.16	7.17	8.20	9.21	10.23	.102
48	1.07	2.10	3.13	4.16	5.19	6.22	7.24	8.27	9.30	10.33	.103
49	1.08	2.12	3.16	4.20	5.23	6.27	7.30	8.35	9.39	10.42	.104
50	1.09	2.14	3.19	4.24	5.28	6.33	7.37	8.43	9.47	10.52	.105
51	1.10	2.16	3.22	4.27	5.33	6.39	7.44	8.50	9.56	10.62	.106
52	1.11	2.18	3.24	4.31	5.38	6.45	7.50	8.58	9.65	10.71	.107
53	1.12	2.20	3.27	4.35	5.43	6.50	7.57	8.66	9.73	10.81	.108
54	1.13	2.22	3.30	4.39	5.47	6.56	7.64	8.73	9.82	10.90	.109
55	1.14	2.24	3.33	4.43	5.52	6.62	7.70	8.81	9.90	11.00	.110
56	1.15	2.26	3.36	4.47	5.57	6.68	7.77	8.89	9.99	11.09	.111
57	1.16	2.28	3.39	4.51	5.62	6.73	7.84	8.96	10.08	11.19	.112
58	1.17	2.30	3.42	4.54	5.67	6.79	7.91	9.04	10.16	11.28	.112
59	1.18	2.32	3.45	4.58	5.71	6.85	7.97	9.12	10.25	11.38	.113
60	1.19	2.33	3.48	4.62	5.76	6.91	8.05	9.19	10.33	11.48	.114

Angle.	110	120	130	140	150	160	170	180	190	200	D
1° 0′	6.31	6.88	7.46	8.03	8.60	9.17	9.74	10.32	10.89	11.46	.057
1	6.42	7.00	7.58	8.16	8.74	9.32	9.90	10.49	11.07	11.65	.058
2	6.52	7.11	7.70	8.30	8.89	9.48	10.07	10.66	11.25	11.84	.059
3	6.63	7.23	7.83	8.43	9.03	9.63	10.23	10.83	11.43	12.03	.060
4	6.73	7.34	7.95	8.56	9.17	9.78	10.39	11.00	11.61	12.22	.061
5	6.84	7.46	8.08	8.70	9.32	9.94	10.55	11.17	11.79	12.41	.062
6	6.94	7.57	8.20	8.83	9.46	10.09	10.72	11.34	11.97	12.60	.063
7	7.05	7.69	8.33	8.96	9.60	10.24	10.88	11.52	12.16	12.79	.064
8	7.15	7.80	8.45	9.10	9.74	10.39	11.04	11.69	12.34	12.98	.065
9	7.26	7.92	8.57	9.23	9.89	10.55	11.20	11.86	12.52	13.18	.066
10	7.36	8.03	8.70	9.36	10.03	10.70	11.37	12.03	12.70	13.37	.067
11	7.47	8.15	8.82	9.50	10.17	10.85	11.53	12.20	12.88	13.56	.068
12	7.57	8.26	8.95	9.63	10.32	11.00	11.69	12.38	13.06	13.75	.069
13	7.68	8.37	9.07	9.77	10.46	11.16	11.85	12.55	12.24	13.94	.070
14	7.78	8.49	9.19	9.90	10.60	11.31	12.01	12.72	13.42	14.13	.070
15	7.89	8.60	9.32	10.03	10.75	11.46	12.18	12.89	13.61	14.32	.071
16	7.99	8.72	9.44	10.17	10.89	11.61	12.34	13.06	13.79	14.51	.072
17	8.10	8.83	9.57	10.30	11.03	11.77	12.50	13.23	13.97	14.70	.073
18	8.20	8.95	9.69	10.43	11.18	11.92	12.66	13.41	14.15	14.89	.074
19	8.31	9.06	9.82	10.57	11.32	12.07	12.83	13.58	14.33	15.08	.075
20	8.42	9.18	9.94	10.70	11.46	12.23	12.99	13.75	14.51	15.27	.076
21	8.52	9.29	10.06	10.83	11.61	12.38	13.15	13.92	14.69	15.46	.077
22	8.63	9.41	10.19	10.97	11.75	12.53	13.31	14.09	14.88	15.65	.078
23	8.73	9.52	10.31	11.09	11.89	12.68	13.47	14.26	15.06	15.85	.079
24	8.84	9.64	10.44	11.23	12.03	12.84	13.64	14.44	15.24	16.04	.080
25	8.94	9.75	10.56	11.36	12.18	12.99	13.80	14.61	15.42	16.23	.081
26	9.05	9.86	10.68	11.49	12.32	13.14	13.96	14.78	15.60	16.42	.082
27	9.15	9.98	10.81	11.63	12.46	13.29	14.12	14.95	15.78	16.61	.083
28	9.26	10.09	10.93	11.76	12.61	13.45	14.29	15.12	15.96	16.80	.084
29	9.36	10.21	11.06	11.89	12.75	13.60	14.45	15.29	16.14	16.99	.085
30	9.47	10.32	11.18	12.03	12.89	13.75	14.61	15.47	16.33	17.18	.086
31	9.57	10.44	11.30	12.16	13.04	13.91	14.77	15.64	16.51	17.37	.087
32	9.68	10.55	11.43	12.30	13.18	14.06	14.93	15.81	16.69	17.56	.088
33	9.78	10.67	11.55	12.43	13.32	14.21	15.10	15.98	16.87	17.75	.089
34	9.89	10.78	11.68	12.56	13.47	14.36	15.26	16.15	17.05	17.94	.090
35	9.99	10.90	11.80	12.70	13.61	14.52	15.42	16.32	17.23	18.13	.090
36	10.10	11.01	11.93	12.83	13.75	14.67	15.58	16.50	17.41	18.33	.091
37	10.20	11.13	12.05	12.96	13.89	14.82	15.74	16.67	17.59	18.52	.092
38	10.31	11.24	12.17	13.10	14.04	14.97	15.91	16.84	17.78	18.71	.093
39	10.41	11.35	12.30	13.23	14.19	15.13	16.07	17.01	17.96	18.90	.094
40	10.52	11.47	12.42	13.36	14.32	15.28	16.23	17.18	18.14	19.09	.095
41	10.62	11.58	12.55	13.50	14.47	15.43	16.39	17.35	18.32	19.28	.096
42	10.73	11.70	12.67	13.63	14.61	15.59	16.56	17.53	18.50	19.47	.097
43	10.83	11.81	12.79	13.77	14.75	15.74	16.72	17.70	18.68	19.66	.098
44	10.94	11.93	12.92	13.90	14.90	15.89	16.88	17.87	18.86	19.85	.099
45	11.04	12.04	13.04	14.03	15.04	16.04	17.04	18.04	19.04	20.04	.100
46	11.15	12.16	13.17	14.17	15.18	16.20	17.20	18.21	19.23	20.23	.101
47	11.25	12.27	13.29	14.30	15.33	16.35	17.37	18.39	19.41	20.42	.102
48	11.36	12.39	13.41	14.43	15.47	16.50	17.53	18.56	19.59	20.61	.103
49	11.46	12.50	13.54	14.57	15.61	16.65	17.69	18.73	19.77	20.81	.104
50	11.57	12.62	13.66	14.70	15.76	16.81	17.85	18.90	19.95	21.00	.105
51	11.67	12.73	13.79	14.83	15.90	16.96	18.02	19.07	20.13	21.19	.106
52	11.78	12.84	13.91	14.97	16.04	17.11	18.18	19.24	20.31	21.38	.107
53	11.88	12.96	14.04	15.10	16.18	17.26	18.34	19.42	20.49	21.57	.108
54	11.99	13.07	14.16	15.24	16.33	17.42	18.50	19.59	20.68	21.76	.109
55	12.09	13.19	14.28	15.37	16.47	17.57	18.66	19.76	20.86	21.95	.110
56	12.20	13.30	14.41	15.50	16.61	17.72	18.83	19.93	21.04	22.14	.111
57	12.30	13.42	14.53	15.64	16.76	17.88	18.99	20.10	21.22	22.33	.112
58	12.41	13.53	14.66	15.77	16.90	18.03	19.15	20.27	21.40	22.52	.112
59	12.51	13.65	14.78	15.90	17.04	18.18	19.31	20.45	21.58	22.71	.113
60	12.62	13.76	14.90	16.05	17.19	18.33	19.47	20.62	21.76	22.90	.114

Angle.	210	220	230	240	250	260	270	280	290	300	D
1° 0′	12.03	12.60	13.17	13.75	14.32	14.89	15.45	16.03	16.60	17.18	.057
1	12.23	12.81	13.39	13.97	14.56	15.14	15.71	16.30	16.88	17.46	.058
2	12.43	13.02	13.61	14.20	14.79	15.38	15.97	16.57	17.16	17.75	.059
3	12.63	13.23	13.83	14.43	15.03	15.63	16.22	16.83	17.43	18.03	.060
4	12.83	13.44	14.05	14.66	15.27	15.88	16.48	17.10	17.71	18.32	.061
5	13.03	13.65	14.27	14.89	15.51	16.13	16.74	17.37	17.99	18.60	.062
6	13.23	13.86	14.49	15.12	15.75	16.38	16.99	17.63	18.26	18.89	.063
7	13.43	14.07	14.71	15.35	15.99	16.62	17.25	17.90	18.54	19.18	.064
8	13.63	14.28	14.93	15.58	16.22	16.87	17.51	18.17	18.81	19.46	.065
9	13.83	14.49	15.15	15.80	16.46	17.12	17.77	18.43	19.09	19.75	.066
10	14.03	14.70	15.37	16.03	16.70	17.37	18.02	18.70	19.37	20.03	.067
11	14.23	14.91	15.59	16.26	16.94	17.62	18.28	18.97	19.64	20.32	.068
12	14.43	15.12	15.81	16.49	17.18	17.96	18.54	19.23	19.92	20.61	.069
13	14.63	15.33	16.02	16.72	17.42	18.11	18.80	19.50	20.20	20.89	.070
14	14.83	15.54	16.24	16.95	17.65	18.36	19.06	19.77	20.47	21.18	.070
15	15.03	15.75	16.46	17.18	17.89	18.61	19.31	20.04	20.75	21.46	.071
16	15.23	15.96	16.68	17.41	18.13	18.86	19.57	20.30	21.03	21.75	.072
17	15.44	16.17	16.90	17.64	18.37	19.10	19.83	20.57	21.30	22.04	.073
18	15.64	16.38	17.12	17.86	18.61	19.35	20.09	20.84	21.58	22.32	.074
19	15.84	16.59	17.34	18.09	18.85	19.60	20.34	21.10	21.86	22.61	.075
20	16.04	16.80	17.56	18.32	19.08	19.85	20.60	21.37	22.13	22.89	.076
21	16.24	17.01	17.78	18.55	19.32	20.09	20.86	21.64	22.41	23.18	.077
22	16.44	17.22	18.00	18.78	19.56	20.34	21.11	21.90	22.68	23.46	.078
23	16.64	17.43	18.22	19.01	19.80	20.59	21.37	22.17	22.96	23.75	.079
24	16.84	17.64	18.43	19.24	20.04	20.83	21.63	22.44	23.24	24.04	.080
25	17.04	17.85	18.66	19.47	20.28	21.09	21.89	22.70	23.51	24.32	.081
26	17.24	18.06	18.88	19.70	20.52	21.33	22.14	22.97	23.79	24.61	.082
27	17.44	18.27	19.09	19.92	20.75	21.58	22.40	23.24	24.07	24.89	.083
28	17.64	18.48	19.31	20.15	20.99	21.83	22.66	23.51	24.34	25.18	.084
29	17.84	18.69	19.53	20.38	21.23	22.08	22.92	23.77	24.62	25.47	.085
30	18.04	18.89	19.75	20.61	21.47	22.33	23.17	24.04	24.90	25.75	.086
31	18.24	19.10	19.97	20.84	21.71	22.57	23.43	24.31	25.18	26.04	.087
32	18.44	19.31	20.19	21.07	21.95	22.82	23.69	24.57	25.45	26.32	.088
33	18.64	19.52	20.41	21.30	22.18	23.07	23.95	24.84	25.73	26.61	.089
34	18.84	19.73	20.63	21.53	22.42	23.32	24.20	25.11	26.00	26.89	.090
35	19.04	19.94	20.85	21.76	22.66	23.57	24.46	25.37	26.28	27.18	.090
36	19.24	20.15	21.07	21.98	22.90	23.81	24.72	25.64	26.56	27.47	.091
37	19.44	20.36	21.29	22.21	23.14	24.06	24.98	25.91	26.83	27.75	.092
38	19.64	20.57	21.51	22.44	23.38	24.31	25.23	26.17	27.11	28.04	.093
39	19.84	20.78	21.73	22.67	23.61	24.56	25.49	26.44	27.39	28.32	.094
40	20.04	20.99	21.95	22.90	23.85	24.80	25.75	26.71	27.66	28.61	.095
41	20.24	21.20	22.16	23.13	24.09	25.05	26.00	26.97	27.94	28.90	.096
42	20.44	21.41	22.38	23.36	24.33	25.30	26.26	27.24	28.22	29.18	.097
43	20.64	21.62	22.60	23.59	24.57	25.55	26.52	27.51	28.49	29.47	.098
44	20.84	21.83	22.82	23.81	24.81	25.80	26.78	27.78	28.77	29.75	.099
45	21.04	22.04	23.04	24.04	25.04	26.04	27.04	28.04	29.04	30.04	.100
46	21.24	22.25	23.26	24.27	25.28	26.24	27.29	28.31	29.32	30.33	.101
47	21.44	22.46	23.48	24.50	25.52	26.54	27.55	28.58	29.60	30.61	.102
48	21.64	22.67	23.70	24.73	25.76	26.79	27.81	28.84	29.87	30.90	.103
49	21.84	22.88	23.92	24.96	26.00	27.04	28.06	29.11	30.15	31.18	.104
50	22.04	23.09	24.14	25.18	26.24	27.28	28.33	29.38	30.43	31.47	.105
51	22.24	23.30	24.36	25.41	26.47	27.53	28.58	29.64	30.70	31.76	.106
52	22.45	23.51	24.58	25.64	26.71	27.78	28.84	29.91	30.98	32.04	.107
53	22.65	23.72	24.80	25.87	26.95	28.03	29.10	30.18	31.26	32.33	.108
54	22.85	23.93	25.02	26.10	27.19	28.28	29.36	30.44	31.53	32.61	.109
55	23.05	24.14	25.24	26.33	27.43	28.52	29.61	30.71	31.81	32.90	.110
56	23.25	24.35	25.45	26.56	27.67	28.77	29.87	30.98	32.09	33.18	.111
57	23.45	24.56	25.67	26.79	27.90	29.02	30.13	31.25	32.36	33.47	.112
58	23.65	24.77	25.89	27.01	28.14	29.27	30.39	31.51	32.64	33.76	.112
59	23.85	24.98	26.11	27.24	28.38	29.51	30.64	31.78	32.91	34.04	.113
60	24.05	25.19	26.33	27.47	28.62	29.76	30.90	32.05	33.19	34.33	.114

Angle.	310	320	330	340	350	360	370	380	390	400	D
1° 0′	17.75	18.32	18.89	19.46	20.03	20.61	21.18	21.75	22.32	22.89	.057
1	18.04	18.62	19.20	19.79	20.37	20.95	21.53	22.11	22.69	23.27	.058
2	18.34	18.93	19.52	20.11	20.70	21.29	21.88	22.47	23.06	23.65	.059
3	18.63	19.23	19.83	20.43	21.03	21.63	22.23	22.84	23.44	24.04	.060
4	18.93	19.54	20.15	20.76	21.37	21.98	22.59	23.20	23.81	24.42	.061
5	19.22	19.84	20.46	21.08	21.70	22.32	22.94	23.56	24.18	24.80	.062
6	19.52	20.15	20.78	21.41	22.03	22.66	23.29	23.92	24.55	25.18	.063
7	19.82	20.45	21.09	21.73	22.37	23.01	23.64	24.28	24.92	25.56	.064
8	20.11	20.76	21.41	22.05	22.70	23.35	24.00	24.65	25.29	25.94	.065
9	20.41	21.06	21.72	22.38	23.04	23.69	24.35	25.01	25.66	26.32	.066
10	20.70	21.37	22.03	22.70	23.37	24.04	24.70	25.37	26.04	26.70	.067
11	21.00	21.67	22.35	23.03	23.70	24.38	25.05	25.73	26.41	27.08	.068
12	21.29	21.98	22.66	23.35	24.04	24.72	25.41	26.09	26.78	27.47	.069
13	21.59	22.28	22.98	23.67	24.37	25.06	25.76	26.46	27.15	27.85	.070
14	21.88	22.59	23.29	24.00	24.70	25.41	26.11	26.82	27.52	28.23	.070
15	22.18	22.89	23.61	24.32	25.04	25.75	26.46	27.18	27.89	28.61	.071
16	22.47	23.20	23.92	24.65	25.37	26.09	26.82	27.54	28.26	28.99	.072
17	22.77	23.50	24.24	24.97	25.70	26.44	27.17	27.90	28.64	29.37	.073
18	23.06	23.81	24.55	25.29	26.04	26.78	27.52	28.27	29.01	29.75	.074
19	23.36	24.11	24.86	25.62	26.37	27.12	27.87	28.63	29.38	30.13	.075
20	23.66	24.42	25.18	25.94	26.70	27.46	28.23	28.99	29.75	30.51	.076
21	23.95	24.72	25.49	26.27	27.04	27.81	28.58	29.35	30.12	30.90	.077
22	24.25	25.03	25.81	26.59	27.37	28.15	28.93	29.71	30.49	31.28	.078
23	24.54	25.33	26.12	26.91	27.70	28.49	29.28	30.08	30.87	31.66	.079
24	24.84	25.64	26.44	27.24	28.04	28.83	29.64	30.44	31.24	32.04	.080
25	25.13	25.94	26.75	27.56	28.37	29.18	29.99	30.80	31.61	32.42	.081
26	25.43	26.25	27.07	27.89	28.70	29.52	30.34	31.16	31.98	32.80	.082
27	25.72	26.55	27.38	28.21	29.04	29.86	30.69	31.52	32.35	33.18	.083
28	26.02	26.86	27.69	28.53	29.37	30.21	31.05	31.89	32.72	33.56	.084
29	26.31	27.16	28.01	28.86	29.71	30.55	31.40	32.25	33.09	33.94	.085
30	26.61	27.47	28.32	29.18	30.04	30.89	31.75	32.61	33.47	34.33	.086
31	26.91	27.77	28.64	29.51	30.37	31.24	32.10	32.97	33.84	34.71	.087
32	27.20	28.08	28.95	29.83	30.71	31.58	32.46	33.33	34.21	35.09	.088
33	27.50	28.38	29.27	30.15	31.04	31.92	32.81	33.70	34.58	35.47	.089
34	27.79	28.69	29.58	30.48	31.37	32.26	33.16	34.06	34.95	35.85	.090
35	28.09	28.99	29.90	30.80	31.71	32.61	33.51	34.42	35.32	36.23	.090
36	28.38	29.30	30.21	31.13	32.04	32.95	33.87	34.78	35.69	36.61	.091
37	28.68	29.60	30.52	31.45	32.37	33.29	34.22	35.14	36.07	37.00	.092
38	28.97	29.91	30.84	31.77	32.71	33.64	34.57	35.51	36.44	37.38	.093
39	29.27	30.21	31.15	32.10	33.04	33.98	34.92	35.87	36.81	37.76	.094
40	29.56	30.52	31.47	32.42	33.37	34.32	35.28	36.23	37.18	38.14	.095
41	29.86	30.82	31.78	32.75	33.71	34.67	35.63	36.59	37.55	38.52	.096
42	30.15	31.13	32.10	33.07	34.04	35.01	35.98	36.95	37.92	38.90	.097
43	30.45	31.43	32.41	33.39	34.37	35.35	36.33	37.32	38.30	39.28	.098
44	30.75	31.74	32.73	33.72	34.71	35.69	36.69	37.68	38.67	39.66	.099
45	31.04	32.04	33.04	34.04	35.04	36.04	37.04	38.04	39.04	40.04	.100
46	31.34	32.35	33.35	34.37	35.37	36.38	37.39	38.40	39.41	40.43	.101
47	31.63	32.65	33.67	34.69	35.71	36.72	37.74	38.76	39.78	40.81	.102
48	31.93	32.96	33.98	35.01	36.04	37.07	38.10	39.13	40.15	41.19	.103
49	32.22	33.26	34.30	35.34	36.38	37.41	38.45	39.49	40.52	41.57	.104
50	32.52	33.57	34.61	35.66	36.71	37.75	38.80	39.85	40.90	41.95	.105
51	32.81	33.87	34.93	35.99	37.04	38.10	39.15	40.21	41.27	42.33	.106
52	33.11	34.18	35.24	36.31	37.38	38.44	39.51	40.57	41.64	42.71	.107
53	33.40	34.48	35.56	36.63	37.71	38.78	39.86	40.94	42.01	43.09	.108
54	33.70	34.79	35.87	36.96	38.04	39.12	40.21	41.30	42.38	43.47	.109
55	33.99	35.09	36.18	37.28	38.38	39.47	40.56	41.66	42.75	43.85	.110
56	34.29	35.40	36.50	37.61	38.71	39.81	40.92	42.02	43.12	44.24	.111
57	34.59	35.70	36.81	37.93	39.04	40.15	41.27	42.38	43.50	44.62	.112
58	34.88	36.01	37.13	38.25	39.38	40.50	41.62	42.75	43.87	45.00	.112
59	35.18	36.31	37.44	38.58	39.71	40.84	41.97	43.11	44.24	45.38	.113
60	35.47	36.62	37.76	38.90	40.04	41.19	42.33	43.47	44.61	45.76	.114

Angle.	210	220	230	240	250	260	270	280	290	300	D
0° 0′	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.000
1	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	.001
2	0.40	0.42	0.44	0.46	0.48	0.50	0.52	0.53	0.55	0.57	.002
3	0.60	0.63	0.66	0.69	0.72	0.74	0.77	0.80	0.83	0.86	.003
4	0.80	0.84	0.88	0.92	0.95	0.99	1.03	1.07	1.11	1.14	.004
5	1.00	1.05	1.10	1.15	1.19	1.24	1.29	1.34	1.38	1.43	.005
6	1.20	1.26	1.32	1.37	1.43	1.49	1.55	1.60	1.66	1.72	.006
7	1.40	1.47	1.54	1.60	1.67	1.74	1.80	1.87	1.94	2.00	.007
8	1.60	1.68	1.76	1.83	1.91	1.99	2 06	2.14	2.21	2.29	.008
9	1.80	1.89	1.98	2.06	2.15	2.23	2.32	2.40	2.49	2.58	.009
10	2.00	2.10	2.20	2.29	2.39	2.48	2.57	2.67	2.77	2.86	.010
11	2.21	2.31	2.42	2.52	2.62	2.73	2.83	2.94	3.04	3.15	.010
12	2.41	2.52	2.64	2.75	2.86	2.98	3.09	3.21	3.32	3.43	.011
13	2.61	2.73	2.85	2.98	3.10	3.23	3.35	3.47	3.60	3.72	.012
14	2.81	2.94	3.07	3.21	3.34	3.47	3.61	3.74	3.87	4.01	.013
15	3.01	3.15	3.29	3.44	3.58	3.72	3.86	4.01	4.15	4.29	.014
16	3.21	3.36	3.51	3.67	3.82	3.97	4.12	4.28	4.43	4.58	.015
17	3.41	3.57	3.73	3.89	4.06	4.22	4.38	4.54	4.70	4.87	.016
18	3.61	3.78	3.95	4.12	4.29	4.47	4.64	4.81	4.98	5.15	.017
19	3.81	3.99	4.17	4.35	4.53	4.71	4.90	5.08	5.26	5.44	.018
20	4.01	4.20	4.39	4.58	4.77	4.96	5.15	5.34	5.54	5.73	.019
21	4.21	4.41	4.61	4.81	5.01	5.21	5.41	5.61	5.81	6.01	.020
22	4.41	4.62	4.83	5.04	5.25	5.46	5.67	5.88	6.09	6.30	.021
23	4.61	4.83	5.05	5.27	5.49	5.71	5.93	6.15	6.37	6.58	.022
24	4.81	5.04	5.27	5.50	5.73	5.96	6.18	6.41	6.64	6.87	.023
25	5.01	5.25	5.49	5.73	5.96	6.20	6.44	6.68	6.92	7.16	.024
26	5.21	5.46	5.71	5.96	6.20	6.45	6.70	6.95	7.20	7.44	.025
27	5.41	5.67	5.93	6.19	6.44	6.70	6.96	7.21	7.47	7.73	.026
28	5.61	5.88	6.15	6.41	6.68	6.95	7.21	7.48	7.75	8.01	.027
29	5.81	6.09	6.37	6.64	6.92	7.20	7.47	7.75	8.03	8.30	.028
30	6.01	6.30	6.59	6.87	7.16	7.44	7.73	8.02	8.30	8.59	.029
31	6.22	6.51	6.81	7.10	7.40	7.69	7.99	8.28	8.58	8.87	.029
32	6.42	6.72	7.03	7.33	7.64	7.94	8.25	8.55	8.86	9.16	.030
33	6.62	6.93	7.25	7.56	7.87	8.19	8.50	8.82	9.13	9.45	.031
34	6.82	7.14	7.47	7.79	8.11	8.44	8.76	9.08	9.41	9.73	.032
35	7.02	7.35	7.69	8.02	8.35	8.69	9.02	9.35	9.69	10.02	.033
36	7.22	7.56	7.91	8.25	8.59	8.93	9.28	9.62	9.96	10.30	.034
37	7.42	7.77	8.13	8.48	8.83	9.18	9.53	9.89	10.24	10.59	.035
38	7.62	7.98	8.34	8.71	9.07	9.43	9.79	10.15	10.52	10.88	.036
39	7.82	8.19	8.56	8.93	9.31	9.68	10.05	10.42	10.79	11.16	.037
40	8.02	8.40	8.78	9.16	9.54	9.93	10.31	10.69	11.07	11.45	.038
41	8.22	8.61	9.00	9.39	9.78	10.17	10.56	10.96	11.35	11.74	.039
42	8.42	8.82	9.22	9.62	10.02	10.42	10.82	11.22	11.62	12.02	.040
43	8.62	9.03	9.44	9.85	10.26	10.67	11.08	11.49	11.90	12.31	.041
44	8.82	9.24	9.66	10.08	10.50	10.92	11.34	11.76	12.18	12.59	.042
45	9.02	9.45	9.88	10.31	10.74	11.17	11.59	12.02	12.45	12.88	.043
46	9.22	9.66	10.10	10.54	10.98	11.41	11.85	12.29	12.73	13.17	.044
47	9.42	9.87	10.32	10.77	11.21	11.66	12.11	12.56	13.01	13.45	.045
48	9.62	10.08	10.54	11.00	11.45	11.91	12.37	12.83	13.28	13.74	.046
49	9.82	10.29	10.76	11.23	11.69	12.16	12.63	13.0,	13.56	14.03	.047
50	10.02	10.50	10.98	11.45	11.93	12.41	12.88	13.36	13.84	14.31	.048
51	10.23	10.71	11.20	11.68	12.17	12.66	13.14	13.63	14.11	14.60	.049
52	10.43	10.92	11.42	11.91	12.41	12.90	13.40	13.89	14.39	14.88	.049
53	10.63	11.13	11.64	12.14	12.65	13.15	13.66	14.16	14.67	15.17	.050
54	10.83	11.34	11.86	12.37	12.88	13.40	13.91	14.43	14.94	15.46	.051
55	11.03	11.55	12.08	12.60	13.12	13.65	14.17	14.70	15.22	15.74	.052
56	11.23	11.76	12.30	12.83	13.36	13.90	14.43	14.96	15.50	16.03	.053
57	11.43	11.97	12.51	13.06	13.60	14.14	14.69	15.23	15.77	16.32	.054
58	11.63	12.18	12.73	13.29	13.84	14.39	14.94	15.50	16.05	16.60	.055
59	11.83	12.39	12.95	13.52	14.08	14.64	15.20	15.76	16.33	16.89	.056
60	12.03	12.60	13.17	13.75	14.32	14.89	15.46	16.03	16.60	17.18	.057

Angle.	310	320	330	340	350	360	370	380	390	400	D
0° 0′	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	0.30	0.31	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	.001
2	0.59	0.61	0.63	0.65	0.67	0.69	0.71	0.72	0.74	0.76	.002
3	0.89	0.92	0.94	0.97	1.00	1.03	1.06	1.09	1.12	1.14	.003
4	1.18	1.22	1.26	1.30	1.34	1.37	1.41	1.45	1.49	1.53	.004
5	1.48	1.53	1.57	1.62	1.67	1.72	1.77	1.81	1.86	1.91	.005
6	1.77	1.83	1.89	1.95	2.00	2.06	2.12	2.17	2.23	2.29	.006
7	2.07	2.14	2.20	2.27	2.34	2.40	2.47	2.54	2.60	2.67	.007
8	2.37	2.44	2.52	2.59	2.67	2.75	2.82	2.90	2.98	3.05	.008
9	2.66	2.75	2.83	2.92	3.01	3.09	3.18	3.26	3.35	3.43	.009
10	2.96	3.05	3.15	3.24	3.34	3.43	3.53	3.62	3.72	3.81	.010
11	3.25	3.36	3.46	3.57	3.67	3.78	3.88	3.99	4.09	4.20	.010
12	3.55	3.66	3.78	3.89	4.01	4.12	4.24	4.35	4.46	4.58	.011
13	3.85	3.97	4.09	4.22	4.34	4.46	4.59	4.71	4.84	4.96	.012
14	4.14	4.27	4.41	4.54	4.67	4.81	4.94	5.07	5.21	5.34	.013
15	4.44	4.58	4.72	4.87	5.01	5.15	5.30	5.44	5.58	5.72	.014
16	4.73	4.88	5.04	5.19	5.34	5.49	5.65	5.80	5.95	6.10	.015
17	5.03	5.19	5.35	5.51	5.68	5.84	6.00	6.16	6.32	6.49	.016
18	5.32	5.50	5.67	5.84	6.01	6.18	6.35	6.52	6.70	6.87	.017
19	5.62	5.80	5.98	6.16	6.34	6.52	6.71	6.89	7.07	7.25	.018
20	5.92	6.11	6.30	6.49	6.68	6.87	7.06	7.25	7.44	7.63	.019
21	6.21	6.41	6.61	6.81	7.01	7.21	7.41	7.61	7.81	8.01	.020
22	6.51	6.72	6.93	7.14	7.35	7.55	7.76	7.97	8.18	8.39	.021
23	6.80	7.02	7.24	7.46	7.68	7.90	8.12	8.34	8.56	8.77	.022
24	7.10	7.33	7.56	7.79	8.01	8.24	8.47	8.70	8.93	9.16	.023
25	7.40	7.63	7.87	8.11	8.35	8.59	8.83	9.06	9.30	9.54	.024
26	7.69	7.94	8.19	8.43	8.68	8.93	9.18	9.42	9.67	9.92	.025
27	7.99	8.24	8.50	8.76	9.02	9.27	9.53	9.79	10.04	10.30	.026
28	8.28	8.55	8.82	9.08	9.35	9.62	9.88	10.15	10.42	10.68	.027
29	8.58	8.85	9.13	9.41	9.68	9.96	10.24	10.51	10.79	11.06	.028
30	8.87	9.16	9.45	9.73	10.02	10.30	10.59	10.87	11.16	11.44	.029
31	9.17	9.46	9.76	10.06	10.35	10.65	10.94	11.24	11.53	11.83	.029
32	9.47	9.77	10.08	10.38	10.68	10.99	11.30	11.60	11.90	12.21	.030
33	9.76	10.07	10.39	10.71	11.02	11.33	11.65	11.96	12.28	12.59	.031
34	10.06	10.38	10.70	11.03	11.35	11.68	12.00	12.32	12.65	12.97	.032
35	10.35	10.69	11.02	11.35	11.69	12.02	12.36	12.69	13.02	13.35	.033
36	10.65	10.99	11.33	11.68	12.02	12.36	12.71	13.05	13.39	13.73	.034
37	10.94	11.30	11.65	12.00	12.35	12.71	13.06	13.41	13.76	14.12	.035
38	11.24	11.60	11.96	12.33	12.69	13.05	13.41	13.77	14.14	14.50	.036
39	11.54	11.91	12.28	12.65	13.02	13.39	13.77	14.14	14.51	14.88	.037
40	11.83	12.21	12.59	12.98	13.36	13.74	14.12	14.50	14.88	15.26	.038
41	12.13	12.52	12.91	13.30	13.69	14.08	14.47	14.86	15.25	15.64	.039
42	12.42	12.82	13.22	13.62	14.02	14.42	14.83	15.22	15.62	16.02	.040
43	12.72	13.13	13.54	13.95	14.36	14.77	15.18	15.59	16.00	16.40	.041
44	13.02	13.43	13.85	14.27	14.69	15.11	15.53	15.95	16.37	16.79	.042
45	13.31	13.74	14.17	14.60	15.03	15.45	15.89	16.31	16.74	17.17	.043
46	13.61	14.04	14.48	14.92	15.36	15.80	16.24	16.67	17.11	17.55	.044
47	13.90	14.35	14.80	15.25	15.69	16.14	16.59	17.04	17.48	17.93	.045
48	14.20	14.65	15.11	15.57	16.03	16.48	16.94	17.40	17.86	18.31	.046
49	14.49	14.96	15.43	15.90	16.36	16.82	17.29	17.76	18.23	18.69	.047
50	14.79	15.27	15.74	16.22	16.69	17.17	17.65	18.12	18.60	19.07	.048
51	15.03	15.57	16.06	16.54	17.03	17.51	18.00	18.49	18.97	19.46	.049
52	15.38	15.88	16.37	16.87	17.36	17.86	18.36	18.85	19.34	19.84	.049
53	15.68	16.18	16.69	17.19	17.70	18.20	18.71	19.21	19.72	20.22	.050
54	15.97	16.49	17.00	17.52	18.03	18.54	19.06	19.57	20.09	20.60	.051
55	16.27	16.79	17.32	17.84	18.36	18.89	19.42	19.94	20.46	20.98	.052
56	16.56	17.10	17.63	18.17	18.70	19.23	19.77	20.30	20.83	21.36	.053
57	16.86	17.40	17.95	18.49	19.03	19.57	20.12	20.66	21.20	21.75	.054
58	17.16	17.71	18.26	18.81	19.37	19.92	20.47	21.02	21.58	22.13	.055
59	17.45	18.01	18.58	19.14	19.70	20.26	20.83	21.39	21.95	22.51	.056
60	17.75	18.32	18.89	19.46	20.03	20.61	21.18	21.75	22.32	22.89	.057

Angle.	410	420	430	440	450	460	470	480	490	500	D
0° 0′	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	.001
2	0.78	0.80	0.82	0.84	0.86	0.88	0.90	0.92	0.93	0.95	.002
3	1.17	1.20	1.23	1.26	1.29	1.32	1.34	1.37	1.40	1.43	.003
4	1.56	1.60	1.64	1.68	1.72	1.75	1.79	1.83	1.87	1.91	.004
5	1.96	2.00	2.05	2.10	2.15	2.19	2.24	2.29	2 34	2.38	.005
6	2.35	2.40	2.46	2.52	2.57	2.63	2.69	2.75	2.80	2.86	.006
7	2.74	2.80	2.87	2.94	3.00	3.07	3.14	3.20	3.27	3.34	.007
8	3.13	3.20	3.28	3.36	3.43	3.51	3.59	3.66	3.74	3.81	.008
9	3.52	3.60	3.69	3.78	3.86	3.95	4.03	4.12	4 21	4.29	.009
10	3.91	4.01	4.10	4.20	4.29	4.39	4.48	4.58	4.67	4.77	.010
11	4.30	4.41	4.51	4.62	4.72	4.83	4.93	5.04	5.14	5.24	.010
12	4.69	4.81	4.92	5.03	5.15	5.26	5.38	5.49	5.61	5.72	.011
13	5.08	5.21	5.33	5.45	5.58	5.70	5.83	5 95	6.08	6.20	.012
14	5.47	5.61	5.74	5.87	6.01	6.14	6.27	6.41	6.54	6.68	.013
15	5.87	6.01	6.15	6.29	6.44	6.58	6.72	6.87	7.01	7.15	.014
16	6.26	6.41	6.56	6.71	6.87	7.02	7.17	7.32	7 48	7.63	.015
17	6.65	6.81	6.97	7.13	7.29	7.46	7.62	7.78	7.94	8.11	.016
18	7.04	7.21	7.38	7.55	7.72	7.90	8.07	8.24	8.41	8.58	.017
19	7.43	7.61	7.79	7.97	8.15	8.34	8.52	8 70	8.88	9.06	.018
20	7.82	8.01	8.20	8.39	8.58	8.77	8.97	9.16	9.35	9.54	.019
21	8.21	8.41	8.61	8.81	9.01	9.21	9.41	9.61	9.81	10.01	.020
22	8.60	8.81	9.02	9.23	9.44	9.65	9.86	10.07	10.28	10.49	.021
23	8.99	9.21	9.43	9.65	9.87	10.09	10.31	10.53	10 75	10.97	.022
24	9.38	9.61	9.84	10.07	10.30	10.53	10.76	10.99	11.22	11.44	.023
25	9.78	10.02	10.25	10.49	10.73	10.97	11.21	11.44	11.68	11.92	.024
26	10.17	10.42	10.66	10.91	11.16	11.41	11.65	11.90	12.15	12.40	.025
27	10.56	10.82	11.07	11.33	11.59	11.84	12.10	12.36	12.62	12.87	.026
28	10.95	11.22	11.48	11.75	12.01	12.28	12.55	12.82	13.08	13.35	.027
29	11.34	11.62	11.89	12.17	12.44	12.72	13.00	13.28	13.55	13.83	.028
30	11.73	12.02	12.30	12.59	12.87	13.16	13.45	13.73	14.02	14.30	.029
31	12.12	12.42	12.71	13.01	13.30	13.60	13.90	14.19	14.49	14.78	.029
32	12.51	12.82	13.12	13.43	13.73	14.04	14.34	14.65	14.95	15.26	.030
33	12.90	13.22	13.53	13.85	14.16	14.48	14.79	15.11	15.42	15.73	.031
34	13 29	13.62	13.94	14.27	14.59	14.92	15.24	15.56	15.89	16.21	.032
35	13.69	14.02	14.35	14.69	15.02	15.35	15.69	16.02	16.36	16.69	.033
36	14.08	14.42	14.76	15.11	15.45	15.79	16.14	16 48	16.82	17.16	.034
37	14.47	14.82	15.17	15.53	15.88	16.23	16.58	16.94	17.29	17.64	.035
38	14.86	15.22	15.58	15.94	16.31	16.67	17.03	17.40	17.76	18.12	.036
39	15.25	15.62	15.99	16.36	16.73	17.11	17.48	17.85	18.22	18.60	.037
40	15.64	16.02	16.40	16.78	17.16	17.55	17.93	18.31	18.69	19.07	.038
41	16.03	16.42	16.81	17.20	17.59	17.99	18.38	18.77	19.16	19.55	.039
42	16.42	16.82	17.22	17.62	18.02	18.43	18.83	19.23	19.63	20.03	.040
43	16.81	17.22	17.63	18.04	18.45	18.86	19.27	19.68	20.11	20.50	.041
44	17.20	17.63	18.04	18.46	18.88	19.30	19.72	20.14	20.56	20.98	.042
45	17.60	18.03	18.45	18.88	19.31	19.74	20.17	20.60	21.03	21.46	.043
46	17.99	18.43	18.86	19.30	19.74	20.18	20.62	21.06	21.50	21.93	.044
47	18.38	18.83	19.27	19.72	20.17	20.62	21.07	21.51	21.96	22.41	.045
48	18.77	19.23	19.68	20.14	20.60	21.06	21.52	21.97	22.43	22.89	.046
49	19.16	19.63	20.09	20.56	21.03	21.50	21.96	22.43	22.90	23.36	.047
50	19.55	20.03	20.51	20.98	21.46	21.94	22.41	22.89	23.37	23.84	.048
51	19.94	20.43	20.92	21.40	21.88	22.37	22.86	23.35	23.83	24.32	.049
52	20.33	20.83	21.33	21.82	22.31	22.81	23.31	23.80	24.30	24.79	.049
53	20.72	21.23	21.74	22.24	22.74	23.25	23 76	24.26	24.77	25.27	.050
54	21.11	21.63	22.15	22.66	23.17	23.69	24.20	24.72	25.24	25.75	.051
55	21.51	22.03	22.56	23.08	23.60	24.13	24.65	25.18	25.70	26.22	.052
56	21.90	22.43	22.97	23.50	24.03	24.57	25.10	25.63	26.17	26.70	.053
57	22.29	22.83	23.38	23.92	24.46	25.01	25.55	26.09	26.64	27.18	.054
58	22.68	23.23	23.79	24.34	24.89	25.44	26.00	26.55	27.10	27.65	.055
59	23.07	23.64	24.20	24.76	25.32	25.88	26.45	27.01	27.57	28.13	.056
60	23.46	24.04	24.61	25.18	25.75	26.32	26.89	27.47	28.04	28.61	.057

Angle.	510	520	530	540	550	560	570	580	590	600	D
0° 0′	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0.00	0.00	0.00	
1	0.49	0.50	0.51	0.51	0.52	0.53	0.54	0.55	0.56	0.57	.001
2	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.11	1.12	1.14	.002
3	1.46	1.49	1.52	1.54	1.57	1.60	1.63	1.66	1.69	1.72	.003
4	1.95	1.98	2.02	2.06	2.10	2.14	2.17	2.21	2.25	2.23	.004
5	2.43	2.48	2.53	2.57	2.62	2.67	2.72	2.76	2.81	2.86	.005
6	2.92	2.98	3.03	3.09	3.15	3.20	3.26	3.32	3.38	3.43	.006
7	3.40	3.47	3.54	3.60	3.67	3.74	3.81	3.87	3.94	4.00	.007
8	3.89	3.97	4.05	4.12	4.20	4.27	4.35	4.42	4.50	4.57	.008
9	4.38	4.46	4.55	4.63	4.72	4.81	4.90	4.97	5.06	5.15	.009
10	4.86	4.96	5.05	5.15	5.24	5.34	5.44	5.53	5.63	5.72	.010
11	5.35	5.45	5.56	5.66	5.77	5.87	5.98	6.08	6.19	6.29	.010
12	5.84	5.95	6.06	6.18	6.29	6.41	6.53	6.64	6.75	6.86	.011
13	6.32	6.45	6.57	6.69	6.82	6.94	7.07	7.19	7.31	7.43	.012
14	6.81	6.94	7.08	7.21	7.34	7.48	7.62	7.74	7.88	8.01	.013
15	7.29	7.44	7.58	7.72	7.87	8.01	8.16	8.29	8.44	8.58	.014
16	7.78	7.93	8.09	8.24	8.39	8.54	8.70	8.85	9.00	9.15	.015
17	8.27	8.43	8.59	8.75	8.92	9.08	9.25	9.40	9.56	9.72	.016
18	8.75	8.93	9.10	9.27	9.44	9.61	9.79	9.95	10.13	10.29	.017
19	9.24	9.42	9.60	9.78	9.96	10.15	10.34	10.51	10.69	10.87	.018
20	9.73	9.92	10.11	10.30	10.49	10.68	10.88	11.06	11.25	11.44	.019
21	10.21	10.41	10.61	10.81	11.01	11.21	11.42	11.61	11.81	12.01	.020
22	10.70	10.91	11.12	11.33	11.54	11.75	11.97	12.17	12.38	12.58	.021
23	11.19	11.40	11.62	11.84	12.06	12.28	12.51	12.72	12.94	13.15	.022
24	11.67	11.90	12.13	12.36	12.59	12.82	13.05	13.27	13.50	13.73	.023
25	12.16	12.40	12.63	12.87	13.11	13.35	13.59	13.82	14.06	14.30	.024
26	12.64	12.89	13.14	13.39	13.64	13.88	14.14	14.38	14.63	14.87	.025
27	13.13	13.39	13.65	13.90	14.16	14.42	14.68	14.93	15.19	15.44	.026
28	13.62	13.88	14.15	14.42	14.68	14.95	15.23	15.48	15.74	16.01	.027
29	14.10	14.38	14.66	14.93	15.21	15.49	15.77	16.03	16.30	16.59	.028
30	14.59	14.88	15.16	15.45	15.73	16.02	16.31	16.59	16.87	17.16	.029
31	15.08	15.37	15.67	15.96	16.26	16.55	16.85	17.14	17.43	17.73	.029
32	15.56	15.87	16.17	16.48	16.78	17.09	17.40	17.70	17.99	18.30	.030
33	16.05	16.36	16.68	16.99	17.31	17.62	17.94	18.25	18.55	18.88	.031
34	16.54	16.86	17.18	17.51	17.83	18.16	18.49	18.80	19.12	19.46	.032
35	17.02	17.35	17.69	18.02	18.36	18.69	19.03	19.35	19.68	20.03	.033
36	17.51	17.85	18.19	18.54	18.88	19.22	19.55	19.91	20.24	20.60	.034
37	18.00	18.35	18.70	19.05	19.40	19.76	20.12	20.46	20.81	21.17	.035
38	18.48	18.84	19.21	19.57	19.93	20.29	20.66	21.01	21.37	21.74	.036
39	18.97	19.34	19.71	20.08	20.45	20.83	21.21	21.57	21.93	22.32	.037
40	19.46	19.83	20.22	20.60	20.98	21.36	21.75	22.12	22.49	22.89	.038
41	19.94	20.33	20.72	21.11	21.50	21.89	22.29	22.67	23.06	23.46	.039
42	20.43	20.83	21.23	21.63	22.03	22.43	22.84	23.23	23.62	24.03	.040
43	20.91	21.32	21.73	22.14	22.55	22.96	23.38	23.78	24.18	24.60	.041
44	21.40	21.82	22.24	22.66	23.08	23.50	23.92	24.33	24.74	25.17	.042
45	21.89	22.31	22.74	23.17	23.60	24.03	24.46	24.88	25.31	25.75	.043
46	22.37	22.81	23.25	23.69	24.12	24.56	25.01	25.44	25.87	26.32	.044
47	22.86	23.30	23.75	24.20	24.65	25.10	25.55	25.99	26.43	26.89	.045
48	23.35	23.80	24.26	24.72	25.17	25.63	26.10	26.54	26.99	27.46	.046
49	23.83	24.30	24.76	25.23	25.70	26.17	26.64	27.10	27.56	28.04	.047
50	24.32	24.79	25.27	25.75	26.22	26.70	27.18	27.65	28.12	28.61	.048
51	24.80	25.29	25.78	26.26	26.75	27.23	27.72	28.20	28.68	29.18	.049
52	25.29	25.78	26.28	26.78	27.27	27.77	28.27	28.76	29.24	29.75	.049
53	25.78	26.28	26.79	27.29	27.80	28.30	28.81	29.31	29.81	30.32	.050
54	26.26	26.78	27.29	27.81	28.32	28.84	29.36	29.86	30.37	30.90	.051
55	26.75	27.27	27.80	28.32	28.84	29.37	29.90	30.41	30.93	31.47	.052
56	27.24	27.77	28.30	28.84	29.37	29.90	30.45	30.97	31.49	32.04	.053
57	27.72	28.26	28.81	29.35	29.89	30.44	30.99	31.52	32.06	32.61	.054
58	28.21	28.75	29.31	29.87	30.42	30.97	31.53	32.07	32.62	33.18	.055
59	28.70	29.25	29.82	30.38	30.94	31.51	32.08	32.63	33.18	33.75	.056
60	29.18	29.75	30.32	30.90	31.47	32.04	32.61	33.18	33.75	34.33	.057

Angle.	10	20	30	40	50	60	70	80	90	100	D
1° 0′	0.60	1.17	1.74	2.31	2.88	3.45	4.03	4.60	5.17	5.74	.057
1	0.61	1.19	1.77	2.35	2.93	3.51	4.09	4.67	5.26	5.84	.058
2	0.62	1.21	1.80	2.39	2.98	3.57	4.16	4.75	5.34	5.93	.059
3	0.63	1.23	1.83	2.43	3.03	3.63	4.23	4.83	5.43	6.03	.060
4	0.64	1.25	1.86	2.47	3.07	3.68	4.29	4.90	5.51	6.12	.061
5	0.65	1.27	1.88	2.50	3.12	3.74	4.36	4.98	5.60	6.22	.062
6	0.66	1.28	1.91	2.54	3.17	3.80	4.43	5.06	5.69	6.31	.063
7	0.67	1.30	1.94	2.58	3.22	3.86	4.50	5.13	5.77	6.41	.064
8	0.68	1.32	1.97	2.62	3.27	3.91	4.56	5.21	5.86	6.51	.065
9	0.69	1.34	2.00	2.66	3.31	3.97	4.63	5.29	5.94	6.60	.066
10	0.70	1.36	2.03	2.70	3.36	4.03	4.70	5.36	6.03	6.70	.067
11	0.71	1.38	2.06	2.73	3.41	4.09	4.76	5.44	6.12	6.79	.068
12	0.72	1.40	2.09	2.77	3.46	4.14	4.83	5.52	6.20	6.89	.069
13	0.73	1.42	2.12	2.81	3.51	4.20	4.90	5.59	6.29	6.98	.070
14	0.73	1.44	2.14	2.85	3.55	4.26	4.96	5.67	6.37	7.08	.070
15	0.74	1.46	2.17	2.89	3.60	4.32	5.03	5.75	6.46	7.17	.071
16	0.75	1.48	2.20	2.93	3.65	4.37	5.10	5.82	6.55	7.27	.072
17	0.76	1.50	2.23	2.97	3.70	4.43	5.16	5.90	6.63	7.37	.073
18	0.77	1.52	2.26	3.00	3.75	4.49	5.22	5.96	6.72	7.46	.074
19	0.78	1.54	2.29	3.04	3.80	4.55	5.29	6.05	6.81	7.56	.075
20	0.79	1.56	2.32	3.08	3.84	4.60	5.36	6.13	6.89	7.65	.076
21	0.80	1.58	2.35	3.12	3.89	4.66	5.42	6.21	6.98	7.75	.077
22	0.81	1.60	2.38	3.16	3.94	4.72	5.49	6.28	7.06	7.84	.078
23	0.82	1.61	2.41	3.20	3.99	4.78	5.56	6.36	7.15	7.94	.079
24	0.83	1.63	2.43	3.24	4.03	4.83	5.63	6.44	7.24	8.04	.080
25	0.84	1.65	2.46	3.27	4.08	4.89	5.69	6.51	7.32	8.13	.081
26	0.85	1.67	2.49	3.31	4.13	4.95	5.76	6.59	7.41	8.23	.082
27	0.86	1.69	2.52	3.35	4.18	5.01	5.83	6.66	7.49	8.32	.083
28	0.87	1.71	2.55	3.39	4.23	5.06	5.89	6.74	7.58	8.42	.084
29	0.88	1.73	2.58	3.43	4.27	5.12	5.96	6.82	7.67	8.51	.085
30	0.89	1.75	2.61	3.47	4.32	5.18	6.03	6.89	7.75	8.61	.086
31	0.90	1.77	2.64	3.50	4.37	5.24	6.10	6.97	7.84	8.70	.087
32	0.91	1.79	2.67	3.54	4.42	5.29	6.16	7.05	7.92	8.80	.088
33	0.92	1.81	2.69	3.58	4.47	5.35	6.23	7.12	8.01	8.90	.089
34	0.93	1.83	2.72	3.62	4.51	5.41	6.30	7.20	8.10	8.99	.090
35	0.94	1.85	2.75	3.66	4.56	5.47	6.36	7.28	8.18	9.10	.090
36	0.95	1.87	2.78	3.70	4.61	5.52	6.43	7.35	8.27	9.18	.091
37	0.96	1.89	2.81	3.74	4.66	5.58	6.50	7.43	8.35	9.28	.092
38	0.97	1.91	2.84	3.77	4.71	5.64	6.57	7.51	8.44	9.37	.093
39	0.98	1.93	2.87	3.81	4.75	5.70	6.63	7.58	8.53	9.47	.094
40	0.99	1.95	2.90	3.85	4.80	5.76	6.70	7.66	8.61	9.56	.095
41	1.00	1.96	2.93	3.89	4.85	5.81	6.77	7.74	8.70	9.66	.096
42	1.01	1.98	2.96	3.93	4.90	5.87	6.83	7.81	8.78	9.76	.097
43	1.02	2.00	2.98	3.97	4.95	5.93	6.90	7.89	8.87	9.85	.098
44	1.03	2.02	3.01	4.00	4.99	5.99	6.97	7.97	8.96	9.95	.099
45	1.04	2.04	3.04	4.04	5.04	6.04	7.03	8.04	9.04	10.04	.100
46	1.05	2.06	3.07	4.08	5.09	6.10	7.10	8.12	9.13	10.14	.101
47	1.06	2.08	3.10	4.12	5.14	6.16	7.17	8.20	9.21	10.23	.102
48	1.07	2.10	3.13	4.16	5.19	6.22	7.24	8.27	9.30	10.33	.103
49	1.08	2.12	3.16	4.20	5.23	6.27	7.30	8.35	9.39	10.42	.104
50	1.09	2.14	3.19	4.24	5.28	6.33	7.37	8.43	9.47	10.52	.105
51	1.10	2.16	3.22	4.27	5.33	6.39	7.44	8.50	9.56	10.62	.106
52	1.11	2.18	3.24	4.31	5.38	6.45	7.50	8.58	9.65	10.71	.107
53	1.12	2.20	3.27	4.35	5.43	6.50	7.57	8.66	9.73	10.81	.108
54	1.13	2.22	3.30	4.39	5.47	6.56	7.64	8.73	9.82	10.90	.109
55	1.14	2.24	3.33	4.43	5.52	6.62	7.70	8.81	9.90	11.00	.110
56	1.15	2.26	3.36	4.47	5.57	6.68	7.77	8.89	9.99	11.09	.111
57	1.16	2.28	3.39	4.51	5.62	6.73	7.84	8.96	10.08	11.19	.112
58	1.17	2.30	3.42	4.54	5.67	6.79	7.91	9.04	10.16	11.28	.112
59	1.18	2.32	3.45	4.58	5.71	6.85	7.97	9.12	10.25	11.38	.113
60	1.19	2.33	3.48	4.62	5.76	6.91	8.05	9.19	10.33	11.48	.114

Angle.	110	120	130	140	150	160	170	180	190	200	D
1° 0′	6.31	6.88	7.46	8.03	8.60	9.17	9.74	10.32	10.89	11.46	.057
1	6.42	7.00	7.58	8.16	8.74	9.32	9.90	10.49	11.07	11.65	.058
2	6.52	7.11	7.70	8.30	8.89	9.48	10.07	10.66	11.25	11.84	.059
3	6.63	7.23	7.83	8.43	9.03	9.63	10.23	10.83	11.43	12.03	.060
4	6.73	7.34	7.95	8.56	9.17	9.78	10.39	11.00	11.61	12.22	.061
5	6.84	7.46	8.08	8.70	9.32	9.94	10.55	11.17	11.79	12.41	.062
6	6.94	7.57	8.20	8.83	9.46	10.09	10.72	11.34	11.97	12.60	.063
7	7.05	7.69	8.33	8.96	9.60	10.24	10.88	11.52	12.16	12.79	.064
8	7.15	7.80	8.45	9.10	9.74	10.39	11.04	11.69	12.34	12.98	.065
9	7.26	7.92	8.57	9.23	9.89	10.55	11.20	11.86	12.52	13.18	.066
10	7.36	8.03	8.70	9.36	10.03	10.70	11.37	12.03	12.70	13.37	.067
11	7.47	8.15	8.82	9.50	10.17	10.85	11.53	12.20	12.88	13.55	.068
12	7.57	8.26	8.95	9.63	10.32	11.00	11.69	12.38	13.06	13.75	.069
13	7.68	8.37	9.07	9.77	10.46	11.16	11.85	12.55	12.24	13.94	.070
14	7.78	8.49	9.19	9.90	10.60	11.31	12.01	12.72	13.42	14.13	.070
15	7.89	8.60	9.32	10.03	10.75	11.46	12.18	12.89	13.61	14.32	.071
16	7.99	8.72	9.44	10.17	10.89	11.61	12.34	13.06	13.79	14.51	.072
17	8.10	8.83	9.57	10.30	11.03	11.77	12.50	13.23	13.97	14.70	.073
18	8.20	8.95	9.69	10.43	11.18	11.92	12.66	13.41	14.15	14.89	.074
19	8.31	9.06	9.82	10.57	11.32	12.07	12.83	13.58	14.33	15.08	.075
20	8.42	9.18	9.94	10.70	11.46	12.23	12.99	13.75	14.51	15.27	.076
21	8.52	9.29	10.06	10.83	11.61	12.38	13.15	13.92	14.69	15.46	.077
22	8.63	9.41	10.19	10.97	11.75	12.53	13.31	14.09	14.88	15.65	.078
23	8.73	9.52	10.31	11.09	11.89	12.68	13.47	14.26	15.06	15.85	.079
24	8.84	9.64	10.44	11.23	12.03	12.84	13.64	14.44	15.24	16.04	.080
25	8.94	9.75	10.56	11.36	12.18	12.99	13.80	14.61	15.42	16.23	.081
26	9.05	9.86	10.68	11.49	12.32	13.14	13.96	14.78	15.60	16.42	.082
27	9.15	9.98	10.81	11.63	12.46	13.29	14.12	14.95	15.78	16.61	.083
28	9.26	10.09	10.93	11.76	12.61	13.45	14.29	15.12	15.96	16.80	.084
29	9.36	10.21	11.06	11.89	12.75	13.60	14.45	15.29	16.14	16.99	.085
30	9.47	10.32	11.18	12.03	12.89	13.75	14.61	15.47	16.33	17.18	.086
31	9.57	10.44	11.30	12.16	13.04	13.91	14.77	15.64	16.51	17.37	.087
32	9.68	10.55	11.43	12.30	13.18	14.06	14.93	15.81	16.69	17.56	.088
33	9.78	10.67	11.55	12.43	13.32	14.21	15.10	15.98	16.87	17.75	.089
34	9.89	10.78	11.68	12.56	13.47	14.36	15.26	16.15	17.05	17.94	.090
35	9.99	10.90	11.80	12.70	13.61	14.52	15.42	16.32	17.23	18.13	.090
36	10.10	11.01	11.93	12.83	13.75	14.67	15.58	16.50	17.41	18.33	.091
37	10.20	11.13	12.05	12.96	13.89	14.82	15.74	16.67	17.59	18.52	.092
38	10.31	11.24	12.17	13.10	14.04	14.97	15.91	16.84	17.78	18.71	.093
39	10.41	11.35	12.30	13.23	14.19	15.13	16.07	17.01	17.96	18.90	.094
40	10.52	11.47	12.42	13.36	14.32	15.28	16.23	17.18	18.14	19.09	.095
41	10.62	11.58	12.55	13.50	14.47	15.43	16.39	17.35	18.32	19.28	.096
42	10.73	11.70	12.67	13.63	14.61	15.59	16.56	17.53	18.50	19.47	.097
43	10.83	11.81	12.79	13.77	14.75	15.74	16.72	17.70	18.68	19.66	.098
44	10.94	11.93	12.92	13.90	14.90	15.89	16.88	17.87	18.86	19.85	.099
45	11.04	12.04	13.04	14.03	15.04	16.04	17.04	18.04	19.04	20.04	.100
46	11.15	12.16	13.17	14.17	15.18	16.20	17.20	18.21	19.23	20.23	.101
47	11.25	12.27	13.29	14.30	15.33	16.35	17.37	18.39	19.41	20.42	.102
48	11.36	12.39	13.41	14.43	15.47	16.50	17.53	18.56	19.59	20.61	.103
49	11.46	12.50	13.54	14.57	15.61	16.65	17.69	18.73	19.77	20.81	.104
50	11.57	12.62	13.66	14.70	15.76	16.81	17.85	18.90	19.95	21.00	.105
51	11.67	12.73	13.79	14.83	15.90	16.96	18.02	19.07	20.13	21.19	.106
52	11.78	12.84	13.91	14.97	16.04	17.11	18.18	19.24	20.31	21.38	.107
53	11.88	12.96	14.04	15.10	16.18	17.26	18.34	19.42	20.49	21.57	.108
54	11.99	13.07	14.16	15.24	16.33	17.42	18.50	19.59	20.68	21.76	.109
55	12.09	13.19	14.28	15.37	16.47	17.57	18.66	19.76	20.86	21.95	.110
56	12.20	13.30	14.41	15.50	16.61	17.72	18.83	19.93	21.04	22.14	.111
57	12.30	13.42	14.53	15.64	16.76	17.88	18.99	20.10	21.22	22.33	.112
58	12.41	13.53	14.66	15.77	16.90	18.03	19.15	20.27	21.40	22.52	.112
59	12.51	13.65	14.78	15.90	17.04	18.18	19.31	20.45	21.58	22.71	.113
60	12.62	13.76	14.90	16.05	17.19	18.33	19.47	20.62	21.76	22.90	.114

Angle.	210	220	230	240	250	260	270	280	290	300	D
1° 0′	12.03	12.60	13.17	13.75	14.32	14.89	15.45	16.03	16.60	17.18	.057
1	12.23	12.81	13.39	13.97	14.56	15.14	15.71	16.30	16.88	17.46	.058
2	12.43	13.02	13.61	14.20	14.79	15.38	15.97	16.57	17.16	17.75	.059
3	12.63	13.23	13.83	14.43	15.03	15.63	16.22	16.83	17.43	18.03	.060
4	12.83	13.44	14.05	14.66	15.27	15.88	16.48	17.10	17.71	18.32	.061
5	13.03	13.65	14.27	14.89	15.51	16.13	16.74	17.37	17.99	18.60	.062
6	13.23	13.86	14.49	15.12	15.75	16.38	16.99	17.63	18.26	18.89	.063
7	13.43	14.07	14.71	15.35	15.99	16.62	17.25	17.90	18.54	19.18	.064
8	13.63	14.28	14.93	15.58	16.22	16.87	17.51	18.17	18.81	19.46	.065
9	13.83	14.49	15.15	15.80	16.46	17.12	17.77	18.43	19.09	19.75	.066
10	14.03	14.70	15.37	16.03	16.70	17.37	18.02	18.70	19.37	20.03	.067
11	14.23	14.91	15.59	16.26	16.94	17.62	18.28	18.97	19.64	20.32	.068
12	14.43	15.12	15.81	16.49	17.18	17.96	18.54	19.23	19.92	20.61	.069
13	14.63	15.33	16.02	16.72	17.42	18.11	18.80	19.50	20.20	20.89	.070
14	14.83	15.54	16.24	16.95	17.65	18.36	19.06	19.77	20.47	21.18	.070
15	15.03	15.75	16.46	17.18	17.89	18.61	19.31	20.04	20.75	21.46	.071
16	15.23	15.96	16.68	17.41	18.13	18.86	19.57	20.30	21.03	21.75	.072
17	15.44	16.17	16.90	17.64	18.37	19.10	19.83	20.57	21.30	22.04	.073
18	15.64	16.38	17.12	17.86	18.61	19.35	20.09	20.84	21.58	22.32	.074
19	15.84	16.59	17.34	18.09	18.85	19.60	20.34	21.10	21.86	22.61	.075
20	16.04	16.80	17.56	18.32	19.08	19.85	20.60	21.37	22.13	22.89	.076
21	16.24	17.01	17.78	18.55	19.32	20.09	20.86	21.64	22.41	23.18	.077
22	16.44	17.22	18.00	18.78	19.56	20.34	21.11	21.90	22.68	23.46	.078
23	16.64	17.43	18.22	19.01	19.80	20.59	21.37	22.17	22.96	23.75	.079
24	16.84	17.64	18.43	19.24	20.04	20.83	21.63	22.44	23.24	24.04	.080
25	17.04	17.85	18.66	19.47	20.28	21.09	21.89	22.70	23.51	24.32	.081
26	17.24	18.06	18.88	19.70	20.52	21.33	22.14	22.97	23.79	24.61	.082
27	17.44	18.27	19.09	19.92	20.75	21.58	22.40	23.24	24.07	24.89	.083
28	17.64	18.48	19.31	20.15	20.99	21.83	22.66	23.51	24.34	25.18	.084
29	17.84	18.69	19.53	20.38	21.23	22.08	22.92	23.77	24.62	25.47	.085
30	18.04	18.89	19.75	20.61	21.47	22.33	23.17	24.04	24.90	25.75	.086
31	18.24	19.10	19.97	20.84	21.71	22.57	23.43	24.31	25.18	26.04	.087
32	18.44	19.31	20.19	21.07	21.95	22.82	23.69	24.57	25.45	26.32	.088
33	18.64	19.52	20.41	21.30	22.18	23.07	23.95	24.84	25.73	26.61	.089
34	18.84	19.73	20.63	21.53	22.42	23.32	24.20	25.11	26.00	26.89	.090
35	19.04	19.94	20.85	21.76	22.66	23.57	24.46	25.37	26.28	27.18	.090
36	19.24	20.15	21.07	21.98	22.90	23.81	24.72	25.64	26.56	27.47	.091
37	19.44	20.36	21.29	22.21	23.14	24.06	24.98	25.91	26.83	27.75	.092
38	19.64	20.57	21.51	22.44	23.38	24.31	25.23	26.17	27.11	28.04	.093
39	19.84	20.78	21.73	22.67	23.61	24.56	25.49	26.44	27.39	28.32	.094
40	20.04	20.99	21.95	22.90	23.85	24.80	25.75	26.71	27.66	28.61	.095
41	20.24	21.20	22.16	23.13	24.09	25.05	26.00	26.97	27.94	28.90	.096
42	20.44	21.41	22.38	23.36	24.33	25.30	26.26	27.24	28.22	29.18	.097
43	20.64	21.62	22.60	23.59	24.57	25.55	26.52	27.51	28.49	29.47	.098
44	20.84	21.83	22.82	23.81	24.81	25.80	26.78	27.78	28.77	29.75	.099
45	21.04	22.04	23.04	24.04	25.04	26.04	27.04	28.04	29.04	30.04	.100
46	21.24	22.25	23.26	24.27	25.28	26.24	27.29	28.31	29.32	30.33	.101
47	21.44	22.46	23.48	24.50	25.52	26.54	27.55	28.58	29.60	30.61	.102
48	21.64	22.67	23.70	24.73	25.76	26.79	27.81	28.84	29.87	30.90	.103
49	21.84	22.88	23.92	24.96	26.00	27.04	28.06	29.11	30.15	31.18	.104
50	22.04	23.09	24.14	25.18	26.24	27.28	28.33	29.38	30.43	31.47	.105
51	22.24	23.30	24.36	25.41	26.47	27.53	28.58	29.64	30.70	31.76	.106
52	22.45	23.51	24.58	25.64	26.71	27.78	28.84	29.91	30.98	32.04	.107
53	22.65	23.72	24.80	25.87	26.95	28.03	29.10	30.18	31.26	32.33	.108
54	22.85	23.93	25.02	26.10	27.19	28.28	29.36	30.44	31.53	32.61	.109
55	23.05	24.14	25.24	26.33	27.43	28.52	29.61	30.71	31.81	32.90	.110
56	23.25	24.35	25.45	26.56	27.67	28.77	29.87	30.98	32.09	33.18	.111
57	23.45	24.56	25.67	26.79	27.90	29.02	30.13	31.25	32.36	33.47	.112
58	23.65	24.77	25.89	27.01	28.14	29.27	30.39	31.51	32.64	33.76	.112
59	23.85	24.98	26.11	27.24	28.38	29.51	30.64	31.78	32.91	34.04	.113
60	24.05	25.19	26.33	27.47	28.62	29.76	30.90	32.05	33.19	34.33	.114

Angle.	310	320	330	340	350	360	370	380	390	400	D
1° 0′	17.75	18.32	18.89	19.46	20.03	20.61	21.18	21.75	22.32	22.89	.057
1	18.04	18.62	19.20	19.79	20.37	20.95	21.53	22.11	22.69	23.27	.058
2	18.34	18.93	19.52	20.11	20.70	21.29	21.88	22.47	23.06	23.65	.059
3	18.63	19.23	19.83	20.43	21.03	21.63	22.23	22.84	23.44	24.04	.060
4	18.93	19.54	20.15	20.76	21.37	21.98	22.59	23.20	23.81	24.42	.061
5	19.22	19.84	20.46	21.08	21.70	22.32	22.94	23.56	24.18	24.80	.062
6	19.52	20.15	20.78	21.41	22.03	22.66	23.29	23.92	24.55	25.18	.063
7	19.82	20.45	21.09	21.73	22.37	23.01	23.64	24.28	24.92	25.56	.064
8	20.11	20.76	21.41	22.05	22.70	23.35	24.00	24.65	25.29	25.94	.065
9	20.41	21.06	21.72	22.38	23.04	23.69	24.35	25.01	25.66	26.32	.066
10	20.70	21.37	22.03	22.70	23.37	24.04	24.70	25.37	26.04	26.70	.067
11	21.00	21.67	22.35	23.03	23.70	24.38	25.05	25.73	26.41	27.08	.068
12	21.29	21.98	22.66	23.35	24.04	24.72	25.41	26.09	26.78	27.47	.069
13	21.59	22.28	22.98	23.67	24.37	25.06	25.76	26.46	27.15	27.85	.070
14	21.88	22.59	23.29	24.00	24.70	25.41	26.11	26.82	27.52	28.23	.070
15	22.18	22.89	23.61	24.32	25.04	25.75	26.46	27.18	27.89	28.61	.071
16	22.47	23.20	23.92	24.65	25.37	26.09	26.82	27.54	28.26	28.99	.072
17	22.77	23.50	24.24	24.97	25.70	26.44	27.17	27.90	28.64	29.37	.073
18	23.06	23.81	24.55	25.29	26.04	26.78	27.52	28.27	29.01	29.75	.074
19	23.36	24.11	24.86	25.62	26.37	27.12	27.87	28.63	29.38	30.13	.075
20	23.66	24.42	25.18	25.94	26.70	27.46	28.23	28.99	29.75	30.51	.076
21	23.95	24.72	25.49	26.27	27.04	27.81	28.58	29.35	30.12	30.90	.077
22	24.25	25.03	25.81	26.59	27.37	28.15	28.93	29.71	30.49	31.28	.078
23	24.54	25.33	26.12	26.91	27.70	28.49	29.28	30.08	30.87	31.66	.079
24	24.84	25.64	26.44	27.24	28.04	28.83	29.64	30.44	31.24	32.04	.080
25	25.13	25.94	26.75	27.56	28.37	29.18	29.99	30.80	31.61	32.42	.081
26	25.43	26.25	27.07	27.89	28.70	29.52	30.34	31.16	31.98	32.80	.082
27	25.72	26.55	27.38	28.21	29.04	29.86	30.69	31.52	32.35	33.18	.083
28	26.02	26.86	27.69	28.53	29.37	30.21	31.05	31.89	32.72	33.56	.084
29	26.31	27.16	28.01	28.86	29.71	30.55	31.40	32.25	33.09	33.94	.085
30	26.61	27.47	28.32	29.18	30.04	30.89	31.75	32.61	33.47	34.33	.086
31	26.91	27.77	28.64	29.51	30.37	31.24	32.10	32.97	33.84	34.71	.087
32	27.20	28.08	28.95	29.83	30.71	31.58	32.46	33.33	34.21	35.09	.088
33	27.50	28.38	29.27	30.15	31.04	31.92	32.81	33.70	34.58	35.47	.089
34	27.79	28.69	29.58	30.48	31.37	32.26	33.16	34.06	34.95	35.85	.090
35	28.09	28.99	29.90	30.80	31.71	32.61	33.51	34.42	35.32	36.23	.090
36	28.38	29.30	30.21	31.13	32.04	32.95	33.87	34.78	35.69	36.61	.091
37	28.68	29.60	30.52	31.45	32.37	33.29	34.22	35.14	36.07	37.00	.092
38	28.97	29.91	30.84	31.77	32.71	33.64	34.57	35.51	36.44	37.38	.093
39	29.27	30.21	31.15	32.10	33.04	33.98	34.92	35.87	36.81	37.76	.094
40	29.56	30.52	31.47	32.42	33.37	34.32	35.28	36.23	37.18	38.14	.095
41	29.86	30.82	31.78	32.75	33.71	34.67	35.63	36.59	37.55	38.52	.096
42	30.15	31.13	32.10	33.07	34.04	35.01	35.98	36.95	37.92	38.90	.097
43	30.45	31.43	32.41	33.39	34.37	35.35	36.33	37.32	38.30	39.28	.098
44	30.75	31.74	32.73	33.72	34.71	35.69	36.69	37.68	38.67	39.66	.099
45	31.04	32.04	33.04	34.04	35.04	36.04	37.04	38.04	39.04	40.04	.100
46	31.34	32.35	33.35	34.37	35.37	36.38	37.39	38.40	39.41	40.43	.101
47	31.63	32.65	33.67	34.69	35.71	36.72	37.74	38.76	39.78	40.81	.102
48	31.93	32.96	33.98	35.01	36.04	37.07	38.10	39.13	40.15	41.19	.103
49	32.22	33.26	34.30	35.34	36.38	37.41	38.45	39.49	40.52	41.57	.104
50	32.52	33.57	34.61	35.66	36.71	37.75	38.80	39.85	40.90	41.95	.105
51	32.81	33.87	34.93	35.99	37.04	38.10	39.15	40.21	41.27	42.33	.106
52	33.11	34.18	35.24	36.31	37.38	38.44	39.51	40.57	41.64	42.71	.107
53	33.40	34.48	35.56	36.63	37.71	38.78	39.86	40.94	42.01	43.09	.108
54	33.70	34.79	35.87	36.96	38.04	39.12	40.21	41.30	42.38	43.47	.109
55	33.99	35.09	36.18	37.28	38.38	39.47	40.56	41.66	42.75	43.85	.110
56	34.29	35.40	36.50	37.61	38.71	39.81	40.92	42.02	43.12	44.24	.111
57	34.59	35.70	36.81	37.93	39.04	40.15	41.27	42.38	43.50	44.62	.112
58	34.88	36.01	37.13	38.25	39.38	40.50	41.62	42.75	43.87	45.00	.112
59	35.18	36.31	37.44	38.58	39.71	40.84	41.97	43.11	44.24	45.38	.113
60	35.47	36.62	37.76	38.90	40.04	41.19	42.33	43.47	44.61	45.76	.114

Angle.	410	420	430	440	450	460	470	480	490	500	D
1° o′	23.46	24.04	24.61	25.18	25.75	26.32	26.89	27.47	28.04	28.61	.057
1	23.85	24.44	25.02	25.60	26.18	26.76	27.34	27.92	28.50	29.09	.058
2	24.25	24.84	25.43	26.02	26.61	27.20	27.79	28.38	28.97	29.56	.059
3	24.64	25.24	25.84	26.44	27.04	27.64	28.24	28.84	29.44	30.04	.060
4	25.03	25.64	26.25	26.86	27.47	28.08	28.68	29.30	29.90	30.51	.061
5	25.42	26.04	26.66	27.28	27.89	28.51	29.13	29.75	30.37	30.99	.062
6	25.81	26.44	27.07	27.69	28.32	28.95	29.58	30.21	30.84	31.47	.063
7	26.20	26.84	27.48	28.11	28.75	29.39	30.03	30.67	31.31	31.94	.064
8	26.59	27.24	27.88	28.53	29.18	29.83	30.48	31.12	31.77	32.42	.065
9	26.98	27.64	28.29	28.95	29.61	30.27	30.92	31.58	32.24	32.90	.066
10	27.37	28.04	28.70	29.37	30.04	30.70	31.37	32.04	32.71	33.37	.067
11	27.76	28.44	29.11	29.79	30.47	31.14	31.82	32.50	33.17	33.85	.068
12	28.15	28.84	29.52	30.21	30.90	31.58	32.27	32.95	33.64	34.32	.069
13	28.54	29.24	29.93	30.63	31.32	32.02	32.71	33.41	34.11	34.80	.070
14	28.93	29.64	30.34	31.05	31.75	32.46	33.16	33.87	34.57	35.28	.070
15	29.32	30.04	30.75	31.47	32.18	32.90	33.61	34.33	35.04	35.75	.071
16	29.71	30.44	31.16	31.89	32.61	33.33	34.06	34.78	35.51	36.23	.072
17	30.10	30.84	31.57	32.31	33.04	33.77	34.51	35.24	35.97	36.70	.073
18	30.49	31.24	31.98	32.72	33.47	34.21	34.95	35.70	36.44	37.18	.074
19	30.89	31.64	32.39	33.14	33.90	34.65	35.40	36.15	36.91	37.66	.075
20	31.28	32.04	32.80	33.56	34.32	35.09	35.85	36.61	37.37	38.13	.076
21	31.67	32.44	33.21	33.98	34.75	35.52	36.30	37.07	37.84	38.61	.077
22	32.06	32.84	33.62	34.40	35.18	35.96	36.74	37.53	38.31	39.09	.078
23	32.45	33.24	34.03	34.82	35.61	36.40	37.19	37.98	38.77	39.56	.079
24	32.84	33.64	34.44	35.24	36.04	36.84	37.64	38.44	39.24	40.04	.080
25	33.23	34.04	34.85	35.66	36.47	37.28	38.09	38.90	39.71	40.51	.081
26	33.62	34.44	35.26	36.08	36.90	37.72	38.53	39.36	40.17	40.99	.082
27	34.01	34.84	35.67	36.50	37.32	38.15	38.98	39.81	40.64	41.47	.083
28	34.40	35.24	36.08	36.92	37.75	38.59	39.43	39.27	41.1	41.94	.084
29	34.79	35.64	36.49	37.34	38.18	39.03	39.88	40.73	41.57	42.42	.085
30	35.18	36.04	36.90	37.76	38.61	39.47	40.33	41.19	42.04	42.90	.086
31	35.57	36.44	37.31	38.17	39.04	39.91	40.77	41.64	42.51	43.37	.087
32	35.96	36.84	37.72	38.59	39.47	40.34	41.22	42.10	42.98	43.85	.088
33	36.35	37.24	38.13	39.01	39.90	40.78	41.67	42.56	43.44	44.32	.089
34	36.74	37.64	38.54	39.43	40.33	41.22	42.12	43.01	43.91	44.80	.090
35	37.13	38.04	38.95	39.85	40.75	41.66	42.56	43.47	44.38	45.28	.090
36	37.53	38.44	39.36	40.27	41.18	42.10	43.01	43.93	44.84	45.75	.091
37	37.92	38.84	39.77	40.69	41.61	42.54	43.46	44.39	45.31	46.23	.092
38	38.31	39.24	40.18	41.11	42.04	42.97	43.91	44.84	45.78	46.70	.093
39	38.70	39.64	40.59	41.53	42.47	43.41	44.35	45.30	46.24	47.18	.094
40	39.09	40.04	41.00	41.95	42.90	43.85	44.80	45.76	46.71	47.66	.095
41	39.48	40.44	41.41	42.37	43.33	44.29	45.25	46.22	47.18	48.13	.096
42	39.87	40.84	41.81	42.79	43.76	44.73	45.70	46.67	47.64	48.61	.097
43	40.26	41.24	42.22	43.20	44.18	45.17	46.15	47.13	48.11	49.09	.098
44	40.65	41.64	42.63	43.62	44.61	45.60	46.59	47.59	48.58	49.56	.099
45	41.04	42.04	43.04	44.04	45.04	46.04	47.04	48.04	49.04	50.04	.100
46	41.43	42.44	43.45	44.46	45.47	46.48	47.49	48.50	49.51	50.51	.101
47	41.82	42.85	43.86	44.88	45.90	46.92	47.94	48.96	49.98	50.99	.102
48	42.21	43.25	44.27	45.30	46.33	47.36	48.38	49.42	50.44	51.47	.103
49	42.60	43.65	44.68	45.72	46.76	47.79	48.83	49.87	50.91	51.94	.104
50	42.99	44.05	45.09	46.14	47.18	48.23	49.28	50.32	51.38	52.42	.105
51	43.38	44.45	45.50	46.55	47.61	48.67	49.73	50.78	51.84	52.90	.106
52	43.78	44.85	45.91	46.98	48.04	49.11	50.17	51.24	52.31	53.37	.107
53	44.17	45.25	46.32	47.40	48.47	49.55	50.62	51.69	52.78	53.85	.108
54	44.56	45.65	46.73	47.82	48.90	49.99	51.07	52.15	53.24	54.32	.109
55	44.95	46.05	47.14	48.24	49.33	50.42	51.52	52.61	53.71	54.80	.110
56	45.34	46.45	47.55	48.65	49.76	50.86	51.97	53.06	54.18	55.28	.111
57	45.73	46.85	47.96	49.07	50.19	51.30	52.41	53.52	54.65	55.75	.112
58	46.12	47.25	48.37	49.49	50.61	51.74	52.86	53.98	55.11	56.23	.112
59	46.51	47.65	48.78	49.91	51.04	52.18	53.31	54.44	55.68	56.71	.113
60	46.90	48.04	49.19	50.33	51.47	52.61	53.76	54.90	56.04	57.18	.114

Angle.	510	520	530	540	550	560	570	580	590	600	D
1° 0′	29.18	29.75	30.32	30.90	31.47	32.04	32.61	33.18	33.75	34.33	.057
1	29.67	30.25	30.83	31.41	31.99	32.57	33.15	33.74	34.32	34.90	.058
2	30.15	30.74	31.33	31.92	32.52	33.11	33.70	34.29	34.88	35.47	.059
3	30.64	31.24	31.84	32.44	33.04	33.64	34.24	34.84	35.44	36.04	.060
4	31.12	31.73	32.34	32.95	33.56	34.17	34.78	35.39	36.00	36.61	.061
5	31.61	32.23	32.85	33.47	34.09	34.71	35.33	35.94	36.56	37.18	.062
6	32.10	32.72	33.35	33.98	34.61	35.24	35.87	36.50	37.13	37.75	.063
7	32.58	33.22	33.86	34.50	35.13	35.77	36.41	37.05	37.69	38.33	.264
8	33.07	33.71	34.36	35.01	35.66	36.31	36.95	37.60	38.25	38.90	.065
9	33.55	34.21	34.87	35.52	36.18	36.84	37.50	38.15	38.81	39.47	.066
10	34.04	34.70	35.37	36.04	36.71	37.37	38.04	38.71	39.37	40.04	.067
11	34.52	35.20	35.88	36.55	37.23	37.91	38.58	39.26	39.94	40.61	.068
12	35.01	35.70	36.38	37.07	37.75	38.44	39.13	39.81	40.50	41.18	.069
13	35.50	36.19	36.89	37.58	38.28	38.97	39.67	40.36	41.06	41.75	.070
14	35.98	36.69	37.39	38.10	38.80	39.51	40.21	40.92	41.62	42.32	.070
15	36.47	37.18	37.90	38.61	39.33	40.04	40.75	41.47	42.18	42.90	.071
16	36.95	37.68	38.40	39.12	39.85	40.57	41.30	42.02	42.74	43.47	.072
17	37.44	38.18	38.91	39.64	40.37	41.11	41.84	42.57	43.31	44.04	.073
18	37.93	38.67	39.41	40.15	40.90	41.64	42.38	43.13	43.87	44.61	.074
19	38.41	39.16	39.92	40.67	41.42	42.17	42.93	43.68	44.43	45.18	.075
20	38.90	39.66	40.42	41.18	42.94	42.71	43.47	44.23	44.99	45.75	.076
21	39.38	40.15	40.93	41.70	42.47	43.24	44.01	44.78	45.55	46.32	.077
22	39.87	40.65	41.43	42.22	42.99	43.77	44.55	45.34	46.12	46.90	.078
23	40.35	41.14	41.93	42.72	43.52	44.31	44.10	45.89	46.68	47.47	.079
24	40.84	41.64	42.44	43.24	44.04	44.84	45.64	46.44	47.24	48.04	.080
25	41.33	42.14	42.94	43.75	44.56	45.37	46.18	46.99	47.80	48.61	.081
26	41.81	42.63	43.45	44.27	45.09	45.91	46.73	47.55	48.36	49.18	.082
27	42.30	43.13	43.95	44.78	45.61	46.44	47.27	48.10	48.93	49.75	.083
28	42.78	43.62	44.46	45.30	46.14	46.97	47.81	48.65	49.49	50.32	.084
29	43.27	44.12	44.96	45.81	46.66	47.51	48.35	49.20	50.05	50.90	.085
30	43.76	44.61	45.47	46.33	47.18	48.04	48.90	49.75	50.61	51.47	.086
31	44.24	45.01	45.97	46.84	47.71	48.57	49.44	50.31	51.17	52.04	.087
32	44.73	45.59	46.48	47.36	48.23	49.11	49.98	50.86	51.74	52.61	.088
33	45.21	46.10	46.98	47.87	48.75	49.64	50.53	51.41	52.30	53.18	.089
34	45.70	46.59	47.49	48.38	49.28	50.18	51.07	51.96	52.86	53.75	.090
35	46.18	47.08	47.99	48.90	49.80	50.71	51.61	52.52	53.42	54.32	.090
36	46.67	47.58	48.50	49.41	50.33	51.24	52.15	53.07	53.98	54.90	.091
37	47.16	48.08	49.00	49.93	50.85	51.78	52.70	53.62	54.54	55.47	.092
38	47.64	48.57	49.51	50.44	51.37	52.31	53.24	54.17	55.11	56.04	.093
39	48.13	49.07	50.01	50.95	51.90	52.84	53.78	54.73	55.67	56.61	.094
40	48.61	49.56	50.52	51.47	52.42	53.38	54.33	55.28	56.23	57.18	.095
41	49.10	50.06	51.02	51.98	52.95	53.91	54.87	55.83	56.79	57.75	.096
42	49.58	50.56	51.53	52.50	53.47	54.44	55.42	56.38	57.35	58.32	.097
43	50.07	51.05	52.03	53.01	53.99	54.98	55.95	56.94	57.92	58.90	.098
44	50.56	51.55	52.54	53.52	54.52	55.51	56.50	57.49	58.48	59.47	.099
45	51.04	52.04	53.04	54.04	55.04	56.04	57.04	58.04	59.04	60.04	.100
46	51.53	52.54	53.55	54.55	55.56	56.58	57.58	58.59	59.60	60.61	.101
47	52.01	53.03	54.05	55.07	56.09	57.11	58.13	59.15	60.16	61.18	.102
48	52.50	53.53	54.55	55.58	56.61	57.64	58.67	59.70	60.73	61.75	.103
49	52.99	54.02	55.06	56.10	57.14	58.18	59.21	60.25	61.29	62.32	.104
50	53.47	54.52	55.56	56.61	57.66	58.71	59.75	60.80	61.85	62.90	.105
51	53.96	55.01	56.07	57.13	58.18	59.24	60.30	61.36	62.41	63.47	.106
52	54.44	55.51	56.57	57.64	58.71	59.78	60.84	61.91	62.97	64.04	.107
53	54.93	56.00	57.08	58.15	59.23	60.31	61.38	62.46	63.54	64.61	.108
54	55.41	56.50	57.58	58.67	59.76	60.84	61.93	63.01	64.10	65.18	.109
55	55.90	56.99	58.09	59.18	60.28	61.38	62.47	63.56	64.66	65.75	.110
56	56.39	57.49	58.59	59.70	60.80	61.91	63.01	64.12	65.22	66.32	.111
57	56.87	57.98	59.10	60.21	61.33	62.44	63.55	64.67	65.78	66.90	.112
58	57.36	58.48	59.60	60.73	61.85	62.98	64 10	65.22	66.34	67.47	.112
59	57.84	58.98	60.11	61.24	62.37	63.51	64.64	65.77	66.91	68.04	.113
60	58.33	59:47	60.61	61.76	62.90	64.04	65.18	66.33	67.47	68.61	.114

Angle.	10	20	30	40	50	60	70	80	90	100	D
2° 0′	1.19	2.33	3.48	4.62	5.76	6.91	8.05	9.19	10.33	11.48	.114
1	1.20	2.35	3.51	4.66	5.81	6.96	8.11	9.27	10.42	11.57	.115
2	1.21	2.37	3.53	4.70	5.86	7.02	8.18	9.34	10.51	11.67	.116
3	1.22	2.39	3.56	4.73	5.91	7.08	8.25	9.42	10.59	11.76	.117
4	1.23	2.41	3.59	4.77	5.95	7.13	8.32	9.50	10.68	11.86	.118
5	1.24	2.43	3.62	4.81	6.00	7.19	8.38	9.57	10.76	11.95	.119
6	1.25	2.45	3.65	4.85	6.05	7.25	8.45	9.65	10.85	12.05	.120
7	1.26	2.47	3.68	4.89	6.10	7.31	8.52	9.73	10.93	12.14	.121
8	1.27	2.49	3.71	4.93	6.15	7.36	8.58	9.80	11.02	12.24	.122
9	1.28	2.51	3.74	4.97	6.19	7.42	8.65	9.88	11.11	12.33	.123
10	1.29	2.53	3.77	5.00	6.24	7.48	8.72	9.95	11.19	12.43	.124
11	1.30	2.55	3.79	5.04	6.29	7.54	8.78	10.03	11.28	12.52	.124
12	1.31	2.57	3.82	5.08	6.34	7.59	8.85	10.11	11.36	12.62	.125
13	1.32	2.59	3.85	5.12	6.38	7.65	8.92	10.18	11.45	12.72	.126
14	1.33	2.61	3.88	5.16	6.43	7.71	8.98	10.26	11.54	12.81	.127
15	1.34	2.63	3.91	5.20	6.48	7.77	9.05	10.34	11.62	12.91	.128
16	1.35	2.64	3.94	5.23	6.53	7.82	9.12	10.41	11.71	13.00	.129
17	1.36	2.66	3.97	5.27	6.58	7.88	9.18	10.49	11.79	13.10	.130
18	1.37	2.68	4.00	5.31	6.62	7.94	9.25	10.56	11.88	13.19	.131
19	1.38	2.70	4.03	5.35	6.67	7.99	9.32	10.64	11.96	13.29	.132
20	1.39	2.72	4.06	5.39	6.72	8.05	9.38	10.72	12.05	13.38	.133
21	1.40	2.74	4.08	5.43	6.77	8.11	9.45	10.79	12.14	13.48	.134
22	1.41	2.76	4.11	5.46	6.82	8.17	9.52	10.87	12.22	13.57	.135
23	1.42	2.78	4.14	5.50	6.86	8.22	9.59	10.95	12.31	13.67	.136
24	1.43	2.80	4.17	5.54	6.91	8.28	9.65	11.02	12.39	13.76	.137
25	1.44	2.82	4.20	5.58	6.96	8.34	9.72	11.10	12.48	13.86	.138
26	1.45	2.84	4.23	5.62	7.01	8.40	9.79	11.18	12.57	13.96	.139
27	1.46	2.86	4.26	5.66	7.05	8.45	9.85	11.25	12.65	14.05	.140
28	1.47	2.88	4.29	5.69	7.10	8.51	9.92	11.33	12.74	14.15	.141
29	1.48	2.90	4.32	5.73	7.15	8.57	9.99	11.41	12.82	14.24	.142
30	1.49	2.92	4.34	5.77	7.20	8.63	10.05	11.48	12.91	14.34	.143
31	1.50	2.94	4.37	5.81	7.25	8.68	10.12	11.56	12.99	14.43	.144
32	1.51	2.96	4.40	5.85	7.29	8.74	10.19	11.63	13.08	14.53	.145
33	1.52	2.97	4.43	5.89	7.34	8.80	10.25	11.71	13.17	14.62	.146
34	1.53	2.99	4.46	5.93	7.39	8.86	10.32	11.79	13.25	14.72	.147
35	1.54	3.01	4.49	5.96	7.44	8.91	10.39	11.86	13.34	14.81	.148
36	1.55	3.03	4.52	6.00	7.49	8.97	10.45	11.94	13.42	14.91	.148
37	1.56	3.05	4.55	6.04	7.53	9.03	10.52	12.02	13.51	15.01	.149
38	1.57	3.07	4.58	6.08	7.58	9.08	10.59	12.09	13.60	15.10	.150
39	1.58	3.09	4.60	6.12	7.63	9.14	10.65	12.17	13.68	15.20	.151
40	1.59	3.11	4.63	6.16	7.68	9.20	10.72	12.25	13.77	15.29	.152
41	1.60	3.13	4.66	6.19	7.72	9.26	10.79	12.32	13.85	15.39	.153
42	1.61	3.15	4.69	6.23	7.77	9.31	10.86	12.40	13.94	15.48	.154
43	1.62	3.17	4.72	6.27	7.82	9.37	10.92	12.47	14.02	15.58	.155
44	1.63	3.19	4.75	6.31	7.87	9.43	10.99	12.55	14.11	15.67	.156
45	1.64	3.21	4.78	6.35	7.92	9.49	11.06	12.63	14.20	15.77	.157
46	1.65	3.23	4.81	6.39	7.96	9.54	11.12	12.70	14.28	15.86	.158
47	1.66	3.25	4.84	6.42	8.01	9.60	11.19	12.78	14.37	15.96	.159
48	1.67	3.27	4.86	6.46	8.06	9.66	11.26	12.86	14.45	16.06	.160
49	1.68	3.28	4.89	6.50	8.11	9.72	11.32	12.93	14.54	16.15	.161
50	1.69	3.30	4.92	6.54	8.16	9.77	11.39	13.01	14.63	16.25	.162
51	1.70	3.32	4.95	6.58	8.20	9.83	11.46	13.09	14.71	16.34	.163
52	1.71	3.34	4.98	6.62	8.25	9.89	11.52	13.16	14.80	16.44	.164
53	1.72	3.36	5.01	6.65	8.30	9.95	11.59	13.24	14.88	16.53	.165
54	1.73	3.38	5.04	6.69	8.35	10.00	11.66	13.31	14.97	16.63	.166
55	1.74	3.40	5.07	6.73	8.39	10.06	11.72	13.39	15.05	16.72	.167
56	1.75	3.42	5.10	6.77	8.44	10.12	11.79	13.47	15.14	16.82	.167
57	1.76	3.44	5.12	6.81	8.49	10.17	11.86	13.54	15.23	16.91	.168
58	1.77	3.46	5.15	6.85	8.54	10.23	11.92	13.62	15.31	17.01	.169
59	1.78	3.48	5.18	6.89	8.59	10.29	11.99	13.70	15.40	17.10	.170
60	1.79	3.50	5.21	6.92	8.63	10.35	12.06	13.77	15.48	17.20	.171

Angle.	110	120	130	140	150	160	170	180	190	200	D
2° 0′	12.62	13.76	14.90	16.05	17.19	18.33	19.47	20.62	21.76	22.90	.114
1	12.72	13.88	15.03	16.18	17.33	18.48	19.64	20.79	21.94	23.09	.115
2	12.83	13.99	15.15	16.31	17.48	18.64	19.80	20.96	22.12	23.29	.116
3	12.93	14.10	15.28	16.45	17.62	18.79	19.96	21.13	22.30	23.47	.117
4	13.04	14.22	15.40	16.58	17.76	18.94	20.12	21.30	22.48	23.66	.118
5	13.14	14.33	15.52	16.71	17.90	19.10	20.28	21.47	22.66	23.85	.119
6	13.25	14.45	15.65	16.85	18.05	19.26	20.45	21.65	22.85	24.05	.120
7	13.35	14.56	15.77	16.98	18.19	19.41	20.61	21.82	23.03	24.24	.121
8	13.46	14.68	15.89	17.11	18.33	19.56	20.77	21.99	23.21	24.43	.122
9	13.56	14.79	16.02	17.25	18.47	19.71	20.93	22.16	23.39	24.62	.123
10	13.67	14.90	16.14	17.38	18.62	19.86	21.09	22.33	23.57	24.81	.124
11	13.77	15.02	16.27	17.51	18.76	20.02	21.25	22.50	23.75	25.00	.124
12	13.88	15.13	16.39	17.65	18.90	20.17	21.42	22.67	23.93	25.19	.125
13	13.98	15.25	16.51	17.78	19.05	20.32	21.58	22.84	24.11	25.38	.126
14	14.09	15.36	16.64	17.91	19.19	20.47	21.74	23.02	24.29	25.57	.127
15	14.19	15.48	16.76	18.05	19.33	20.63	21.90	23.19	24.47	25.76	.128
16	14.30	15.59	16.89	18.18	19.47	20.78	22.06	23.36	24.65	25.95	.129
17	14.40	15.71	17.01	18.31	19.62	20.93	22.23	23.53	24.83	26.14	.130
18	14.51	15.82	17.13	18.45	19.76	20.08	22.39	23.70	25.01	26.33	.131
19	14.61	15.93	17.26	18.58	19.90	21.24	22.55	23.87	25.20	26.52	.132
20	14.72	16.05	17.38	18.71	20.05	21.39	22.71	24.04	25.38	26.71	.133
21	14.82	16.16	17.50	18.85	20.19	21.54	22.87	24.22	25.56	26.90	.134
22	14.93	16.28	17.63	18.98	20.33	21.69	23.03	24.39	25.74	27.09	.135
23	15.03	16.39	17.75	19.11	20.47	21.84	23.20	24.56	25.92	27.28	.136
24	15.14	16.51	17.88	19.25	20.62	22.00	23.36	24.73	26.10	27.47	.137
25	15.24	16.62	18.00	19.38	20.76	22.15	23.52	24.90	26.28	27.66	.138
26	15.34	16.73	18.12	19.51	20.90	22.30	23.68	25.07	26.46	27.85	.139
27	15.45	16.85	18.25	19.65	21.05	22.45	23.84	25.24	26.64	28.04	.140
28	15.55	16.96	18.37	19.78	21.19	22.61	24.01	25.41	26.82	28.23	.141
29	15.66	17.08	18.49	19.91	21.33	22.76	24.17	25.59	27.00	28.42	.142
30	15.76	17.19	18.62	20.05	21.47	22.91	24.33	25.76	27.18	28.61	.143
31	15.87	17.31	18.74	20.18	21.62	23.06	24.49	25.93	27.37	28.80	.144
32	15.97	17.42	18.87	20.31	21.76	23.22	24.65	26.10	27.55	28.99	.145
33	16.08	17.53	18.99	20.45	21.90	23.37	24.81	26.27	27.73	29.18	.146
34	16.18	17.65	19.11	20.58	22.04	23.52	24.98	26.44	27.91	29.37	.147
35	16.29	17.76	19.24	20.71	22.19	23.67	25.14	26.61	28.09	29.56	.148
36	16.39	17.88	19.36	20.85	22.33	23.82	25.30	26.78	28.27	29.75	.148
37	16.50	17.99	19.49	20.98	22.47	23.98	25.46	26.96	28.45	29.94	.149
38	16.60	18.11	19.61	21.11	22.62	24.13	25.62	27.13	28.63	30.13	.150
39	16.71	18.22	19.73	21.25	22.76	24.28	25.79	27.30	28.81	30.32	.151
40	16.81	18.33	19.86	21.38	22.90	24.43	25.95	27.47	28.99	30.51	.152
41	16.92	18.45	19.98	21.51	23.04	24.59	26.11	27.64	29.17	30.70	.153
42	17.02	18.56	20.10	21.65	23.19	24.74	26.27	27.81	29.35	30.90	.154
43	17.13	18.68	20.23	21.78	23.33	24.89	26.43	27.98	29.53	31.09	.155
44	17.23	18.79	20.35	21.91	23.47	25.04	26.59	28.16	29.72	31.28	.156
45	17.34	18.91	20.48	22.05	23.62	25.20	26.76	28.33	29.90	31.47	.157
46	17.44	19.02	20.60	22.18	23.76	25.35	26.92	28.50	30.08	31.66	.158
47	17.55	19.14	20.72	22.31	23.90	25.50	27.08	28.67	30.26	31.85	.159
48	17.65	19.25	20.85	22.45	24.04	25.65	27.24	28.84	30.44	32.04	.160
49	17.76	19.36	20.97	22.58	24.19	25.81	27.40	29.01	30.62	32.23	.161
50	17.86	19.48	21.10	22.71	24.33	25.96	27.57	29.18	30.80	32.42	.162
51	17.97	19.59	21.22	22.85	24.47	26.11	27.73	29.35	30.98	32.61	.163
52	18.07	19.71	21.34	22.98	24.62	26.26	27.89	29.53	31.16	32.80	.164
53	18.18	19.82	21.47	23.11	24.76	26.41	28.05	29.70	31.34	32.99	.165
54	18.28	19.94	21.59	23.25	24.90	26.57	28.21	29.87	31.52	33.18	.166
55	18.39	20.05	21.71	23.38	25.04	26.72	28.37	30.04	31.70	33.37	.167
56	18.49	20.16	21.84	23.51	25.19	26.87	28.54	30.21	31.89	33.56	.167
57	18.60	20.28	21.96	23.65	25.33	27.02	28.70	30.38	32.07	33.75	.168
58	18.70	20.39	22.09	23.78	25.47	27.18	28.86	30.55	32.25	33.94	.169
59	18.80	20.51	22.21	23.91	25.61	27.33	29.02	30.72	32.43	34.13	.170
60	18.91	20.62	22.33	24.05	25.76	27.47	29.18	30.90	32.61	34.32	.171

Angle.	210	220	230	240	250	260	270	280	290	300	D
2° 0′	24.05	25.19	26.33	27.47	28.62	29.76	30.90	32.05	33.19	34.33	.114
1	24.25	25.40	26.55	27.70	28.85	30.01	31.16	32.31	33.46	34 62	.115
2	24.45	25.61	26.77	27.93	29.09	30.25	31.42	32.58	33.74	34.90	.116
3	24.65	25.82	26.99	28.16	29.33	30.50	31.67	32.84	34.01	35.19	.117
4	24.85	26.03	27.21	28.39	29.57	30.75	31.93	33.11	34.29	35.47	.118
5	25.04	26.23	27.43	28.62	29.81	31.00	32.19	33.38	34.57	35.76	.119
6	25.24	26.44	27.64	28.84	30.04	31.24	32.44	33.64	34.84	36.04	.120
7	25.44	26.65	27.86	29.07	30.28	31.49	32.70	33.91	35.12	36.33	.121
8	25.64	26.85	28.08	29.30	30.52	31.74	32.96	34.17	35.39	36.61	.122
9	25.84	27.07	28.30	29.53	30.76	31.98	33.21	34.44	55.67	36.90	.123
10	26.04	27.28	28.52	29.76	30.99	32.23	33.47	34.71	35.94	37.18	.124
11	26.24	27.49	28.74	29.98	31.23	32.48	33.73	34.97	36.22	37.47	.124
12	26.44	27.70	28.96	30.21	31.47	32.73	33.98	35.24	36.50	37.75	.125
13	26.64	27.91	29.18	30.44	31.71	32.97	34.24	35.51	36.77	38.04	.126
14	26.84	28.12	29.39	30.67	31.95	33.22	34.50	35.77	37.05	38.32	.127
15	27.04	28.33	29.61	30.90	32.18	33.47	34.75	36.04	37.32	38.61	.128
16	27.24	28.54	29.83	31.13	32.42	33.72	35.01	36.30	37.60	38.89	.129
17	27.44	28.75	30.05	31.35	32.66	33.96	35.27	36.57	37.87	39.18	.130
18	27.64	28.96	30.27	31.58	32.90	34.21	35.52	36.84	38 15	39.46	.131
19	27.84	29.16	30.49	31.81	33.13	34.46	35.78	37.10	38.43	39.75	.132
20	28.04	29.37	30.71	32.04	33.37	34.70	36.04	37.37	38.70	40.03	.133
21	28.24	29.58	30.93	32.27	33.61	34.95	36.29	37.64	38.98	40.32	.134
22	28.44	29.79	31.14	32.50	33.85	35.20	36.55	37.90	39.25	40.61	.135
23	28.64	30.00	31.36	32.72	34.09	35.45	36 81	38.17	39.53	40.89	.136
24	28.84	30.21	31.58	32.95	34.32	35.69	37.06	38.43	39.80	41.18	.137
25	29.04	30.42	31.80	33.18	34.56	35.94	37.32	38.70	40.08	41.46	.138
26	29.24	30.63	32.02	33.41	34.80	36.19	37.58	38.97	40.36	41.75	.139
27	29,44	30.84	32.24	33.64	35.04	36.43	37.83	39.23	40.63	42.03	.140
28	29.64	31.05	32.46	33.87	35.27	36.68	38.09	39.50	40.91	42.32	.141
29	29.84	31.26	32.68	34.09	35.51	36.93	38.35	39.75	41.18	42.60	.142
30	30.04	31.47	32.89	34.32	35.75	37.18	38.60	40.03	41.46	42.89	.143
31	30.24	31.68	33.11	34.55	35.99	37.42	38.86	40.30	41.74	43.17	.144
32	30.44	31.88	33.33	34.78	36.22	37 67	39.12	40.56	42.01	43.46	.145
33	30.64	32.09	33.55	35.01	36.46	37.92	39.37	40.83	42.29	43.74	.146
34	30.84	32.30	33.77	35.24	36.70	38.17	39.63	41.10	42.56	44.03	.147
35	31.04	32.51	33.99	35.46	36.94	38.41	39.89	41.36	42.84	44.31	.148
36	31.24	32.72	34.21	35.69	37.18	38.66	40.14	41.63	43.11	44.60	.148
37	31.44	32.93	34.43	35.92	37.41	38.91	40.40	41.89	43.39	44.88	.149
38	31.64	33.14	34.64	36.15	37.65	39.15	40.66	42.16	43.67	45.17	.150
39	31.84	33.35	34.86	36.38	37.89	39.40	40.91	42.43	43.94	45.45	.151
40	32.04	33.56	35.08	36.61	38.13	39.65	41.17	42.69	44.22	45.74	.152
41	32.24	33.77	35.30	36.83	38.36	39.90	41.43	42.96	44.49	46.02	.153
42	32.44	33.98	35.52	37.06	38.60	40.14	41.68	43.23	44.77	46.31	.154
43	32.64	34.19	35.73	37.29	38.84	40.39	41.94	43.49	45.04	46.59	.155
44	32.84	34.40	35.96	37.51	39.08	40.64	42.20	43.76	45.32	46.88	.156
45	33.04	34.61	36.18	37.75	39.32	40.88	42.46	44.02	45.60	47.17	.157
46	33.23	34.81	36.39	37.98	39.55	41.13	42.71	44.29	45.87	47.45	.158
47	33.43	35.02	36.61	38.20	39.79	41.38	42.97	44.56	46.15	47.74	.159
48	33.63	35.23	36.83	38.43	40.03	41.63	43.23	44.82	46.42	48.02	.160
49	33.83	35.44	37.05	38.66	40.27	41.87	43.48	45.09	46.70	48.31	.161
50	34.03	35.65	37.27	38.89	40.50	42.12	43.74	45.36	46.97	48.59	.162
51	34.23	35.86	37.49	39.12	40.74	42.37	44.00	45.62	47.25	48.88	.163
52	34.43	36.07	37.71	39.35	40.98	42.62	44.25	45.89	47.53	49.16	.164
53	34.63	36.28	37 93	39.57	41.22	42.86	44.51	46.15	47.80	49.45	.165
54	34.83	36.49	38.14	39.80	41.46	43.11	44.77	46.42	48.08	49.73	.165
55	35.03	36.70	38.36	40.03	41.69	43.36	45.02	46.69	48.35	50.02	.167
56	35.23	36.91	38.58	40.26	41.93	43.60	45.28	46.95	48.63	50.30	.167
57	35.43	37.12	38.80	40.49	42.17	43.85	45.54	47.22	48.90	50.59	.168
58	55.63	37.33	39.02	40.71	42.41	44.10	45.79	47.49	49.18	50.87	.169
59	35.83	37.54	39.24	40.94	42.64	44.35	46.05	47.75	49.46	51.16	.170
60	36.03	37.74	39.46	41.17	42.88	44.59	46.31	48.02	49.73	51.44	.171

Angle.	310	320	330	340	350	360	370	380	390	400	D
2° 0′	35.47	36.62	37.76	38.90	40.04	41.19	42.33	43.47	44.61	45.76	.114
1	35.77	36.92	38.07	39.22	40.38	41.53	42.68	43.83	44.99	46.14	.115
2	36.06	37.22	38.39	39.55	40.71	41.87	43.03	44.19	45.36	46.52	.116
3	36.36	37.53	38.70	39.87	41.04	42.21	43.38	44.56	45.73	46.90	.117
4	36.65	37.83	39.01	40.19	41.37	42.56	43.74	44.92	46.10	47.28	.118
5	36.95	38.14	39.33	40.52	41.71	42.90	44.09	45.28	46.47	47.66	.119
6	37.24	38.44	39.64	40.84	42.04	43.24	44.44	45.64	46.84	48.04	.120
7	37.54	38.75	39.95	41.16	42.37	43.58	44.79	46.00	47.21	48.42	.121
8	37.83	39.05	40.27	41.49	42.71	43.92	45.14	46.36	47.58	48.80	.122
9	38.13	39.35	40.58	41.81	43.04	44.27	45.49	46.72	47.95	49.18	.123
10	38.42	39.66	40.90	42.13	43.37	44.61	45.85	47.08	48.32	49.56	.124
11	38.71	39.96	41.21	42.46	43.70	44.95	46.20	47.44	48.69	49.94	.124
12	39.01	40.27	41.52	42.78	44.04	45.29	46.55	47.81	49.06	50.32	.125
13	39.30	40.57	41.84	43.10	44.37	45.64	46.90	48.17	49.43	50.70	.126
14	39.60	40.87	42.15	43.43	44.70	45.98	47.25	48.53	49.80	51.08	.127
15	39.89	41.18	42.46	43.75	45.03	46.32	47.60	48.89	50.17	51.46	.128
16	40.19	41.48	42.78	44.07	45.37	46.66	47.96	49.25	50.54	51.84	.129
17	40.48	41.79	43.09	44.40	45.70	47.00	48.31	49.61	50.92	52.22	.130
18	40.78	42.09	43.41	44.72	46.03	47.35	48.66	49.97	51.29	52.60	.131
19	41.07	42.40	43.72	45.04	46.37	47.69	49.01	50.33	51.66	52.98	.132
20	41.37	42.70	44.03	45.37	46.70	48.03	49.36	50.70	52.03	53.36	.133
21	41.66	43.00	44.35	45.69	47.03	48.37	49.71	51.06	52.40	53.74	.134
22	41.97	43.31	44.66	46.01	47.36	48.72	50.07	51.42	52.77	54.12	.135
23	42.25	43.61	44.97	46.33	47.70	49.06	50.42	51.78	53.14	54.50	.136
24	42.55	43.92	45.29	46.66	48.03	49.40	50.77	52.14	53.51	54.88	.137
25	42.84	44.22	45.60	46.98	48.36	49.74	51.12	52.50	53.88	55.26	.138
26	43.14	44.53	45.91	47.30	48.69	50.08	51.47	52.86	54.25	55.64	.139
27	43.43	44.83	46.23	47.63	49.03	50.43	51.82	53.22	54.62	56.02	.140
28	43.73	45.13	46.54	47.95	49.36	50.77	52.18	53.58	54.99	56.40	.141
29	44.02	45.44	46.86	48.27	49.69	51.11	52.53	53.95	55.36	56.78	.142
30	44.32	45.74	47.17	48.60	50.03	51.45	52.88	54.31	55.73	57.16	.143
31	44.61	46.05	47.48	48.92	50.36	51.79	53.23	54.67	56.10	57.54	.144
32	44.90	46.35	47.86	49.24	50.69	52.14	53.58	55.03	56.48	57.92	.145
33	45.20	46.65	48.11	49.57	51.02	52.48	53.93	55.39	56.85	58.30	.146
34	45.49	46.96	48.42	49.89	51.36	52.82	54.29	55.75	57.22	58.68	.147
35	45.79	47.26	48.74	50.21	51.69	53.16	54.64	56.11	57.59	59.06	.148
36	46.08	47.57	49.05	50.54	52.02	53.51	54.99	56.47	57.96	59.44	.148
37	46.38	47.87	49.37	50.86	52.35	53.85	55.34	56.83	58.33	59.82	.149
38	46.67	48.18	49.68	51.18	52.69	54.19	55.69	57.20	58.70	60.20	.150
39	46.96	48.48	49.99	51.51	53.02	54.53	56.04	57.56	59.07	60.58	.151
40	47.26	48.78	50.31	51.83	53.35	54.87	56.39	57.92	59.44	60.96	.152
41	47.56	49.09	50.62	52.15	53.68	55.22	56.75	58.28	59.81	61.34	.153
42	47.85	49.39	50.93	52.48	54.02	55.56	57.10	58.64	60.18	61.72	.154
43	48.15	49.70	51.25	52.80	54.35	55.90	57.45	59.00	60.55	62.10	.155
44	48.44	50.00	51.56	53.12	54.68	56.24	57.80	59.36	60.92	62.48	.156
45	48.74	50.30	51.88	53.45	55.02	56.59	58.15	59.72	61.29	62.86	.157
46	49.03	50.61	52.19	53.77	55.35	56.93	58.50	60.08	61.66	63.24	.158
47	49.33	50.91	52.50	54.09	55.68	57.27	58.86	60.45	62.04	63.62	.159
48	49.62	51.22	52.82	54.41	56.01	57.61	59.21	60.81	62.41	64.00	.160
49	49.91	51.52	53.13	54.74	56.35	57.95	59.56	61.17	62.78	64.38	.161
50	50.21	51.83	53.44	55.06	56.68	58.30	59.91	61.53	63.15	64.76	.162
51	50.50	52.13	53.76	55.38	57.01	58.64	60.26	61.89	63.52	65.15	.163
52	50.80	52.43	54.07	55.71	57.34	58.98	60.61	62.25	63.89	65.53	.164
53	51.09	52.74	54.38	56.03	57.68	59.32	60.97	62.61	64.26	65.91	.165
54	51.39	53.04	54.70	56.35	58.01	59.67	61.32	62.97	64.63	66.29	.166
55	51.68	53.35	55.01	56.68	58.34	60.01	61.67	63.34	65.00	66.67	.167
56	51.98	53.65	55.33	57.00	58.68	60.35	62.02	63.70	65.37	67.05	.167
57	52.29	53.96	55.64	57.32	59.01	60.69	62.37	64.06	65.74	67.43	.168
58	52.57	54.26	55.95	57.65	59.34	61.03	62.72	64.42	66.11	67.81	.169
59	52.86	54.56	56.27	57.97	59.67	61.38	63.08	64.78	66.48	68.19	.170
60	53.16	54.87	56.58	58.29	60.01	61.72	63.43	65.14	66.85	68.57	.171

Angle.	410	420	430	440	450	460	470	480	490	500	D
2° 0′	46.90	48.04	49.19	50.33	51.47	52.61	53.76	54.90	56.04	57.18	.114
1	47.29	48.44	49.59	50.75	51.90	53.05	54.20	55.36	56.51	57.66	.115
2	47.70	48.84	50.00	51.16	52.33	53.49	54.65	55.81	56.97	58.13	.116
3	48.07	49.24	50.41	51.58	52.75	53.93	55.10	56.27	57.44	58.61	.117
4	48.46	49.64	50.82	52.00	53.18	54.36	55.54	56.72	57.90	59.08	.118
5	48.85	50.04	51.23	52.42	53.61	54.80	55.99	57.18	58.37	59.56	.119
6	49.24	40.44	51.64	52.84	54.04	55.24	56.44	57.64	58.84	60.03	.120
7	49.63	50.84	52.05	53.26	54.46	55.67	56.88	58.09	59.30	60.51	.121
8	50.02	51.24	52.45	53.67	54.89	56.11	57.33	58.55	59.77	60.98	.122
9	50.41	51.64	52.86	54.09	55.32	56.55	57.78	59.00	60.23	61.46	.123
10	50.80	52.03	53.27	54.51	55.75	56.99	58.22	59.46	60.70	61.94	.124
11	51.19	52.43	53.68	54.93	56.18	57.42	58.67	59.92	61.16	62.41	.124
12	51.58	52.83	54.09	55.35	56.60	57.86	59.12	60.37	61.63	62.89	.125
13	51.97	53.23	54.50	55.76	57.03	58.30	59.56	60.83	62.09	63.36	.126
14	52.36	53.63	54.91	56.18	57.46	58.73	60.01	61.28	62.56	63.84	.127
15	52.75	54.03	55.32	56.60	57.89	59.17	60.46	61.74	63.03	64.31	.128
16	53.13	54.43	55.72	57.02	58.31	59.61	60.90	62.20	63.49	64.79	.129
17	53.54	54.83	56.13	57.44	58.74	60.04	61.35	62.65	63.96	65.26	.130
18	53.91	55.23	56.54	57.85	59.17	60.48	61.80	63.11	64.42	65.74	.131
19	54.30	55.63	56.95	58.27	59.60	60.92	62.24	63.57	64.89	66.21	.132
20	54.69	56.03	57.36	58.69	60.02	61.36	62.69	64.02	65.35	66.69	.133
21	55.08	56.43	57.77	59.11	60.45	61.79	63.14	64.48	65.82	67.16	.134
22	55.47	56.82	58.18	59.53	60.88	62.23	63.58	64.93	66.29	67.64	.135
23	55.86	57.22	58.58	59.95	61.31	62.67	64.03	65.39	66.75	68.11	.136
24	56.25	57.62	58.99	60.36	61.73	63.10	64.48	65.85	67.22	68.59	.137
25	56.64	58.02	59.40	60.78	62.16	63.54	64.92	66.30	67.68	69.06	.138
26	57.03	58.42	59.81	61.20	62.59	63.98	65.37	66.76	68.15	69.54	.139
27	57.42	58.82	60.22	61.62	63.02	64.42	65.81	67.21	68.61	70.01	.140
28	57.81	59.22	60.63	62.04	63.44	64.85	66.26	67.67	69.08	70.49	.141
29	58.20	59.62	61.04	62.45	63.87	65.29	66.71	68.13	69.54	70.96	.142
30	58.59	60.02	61.44	62.87	64.30	65.73	67.15	68.58	70.01	71.44	.143
31	58.98	60.42	61.85	62.29	64.73	66.16	67.60	69.04	70.48	71.91	.144
32	59.37	60.82	62.26	63.71	65.15	66.60	68.05	69.49	70.94	72.39	.145
33	59.76	61.21	62.67	64.13	65.58	67.04	68.49	69.95	71.41	72.86	.146
34	60.15	61.61	63.08	64.54	66.01	67.48	68.94	70.41	71.87	73.34	.147
35	60.54	62.01	63.49	64.96	66.44	67.91	69.39	70.86	72.34	73.81	.148
36	60.93	62.41	63.90	65.38	66.86	68.35	69.83	71.32	72.80	74.29	.148
37	61.32	62.81	64.31	65.80	67.29	68.79	70.28	71.78	73.27	74.76	.149
38	61.71	63.21	64.71	66.22	67.72	69.22	70.73	72.23	73.73	75.24	.150
39	62.10	63.61	65.12	66.64	68.15	69.66	71.17	72.69	74.20	75.71	.151
40	62.49	64.01	65.53	67.05	68.57	70.10	71.62	73.14	74.67	76.19	.152
41	62.88	64.41	65.94	67.47	69.00	70.54	72.07	73.60	75.13	76.66	.153
42	63.27	64.81	66.35	67.89	69.43	70.07	72.51	74.06	75.60	77.14	.154
43	63.66	65.21	66.76	68.31	69.86	71.41	72.96	74.51	76.06	77.61	.155
44	64.04	65.61	67.17	68.73	70.29	71.85	73.41	74.97	76.53	78.09	.156
45	64.43	66.00	67.57	69.14	70.71	72.28	73.85	74.42	76.99	78.56	.157
46	64.82	66.40	67.98	69.56	71.14	72.72	74.30	75.88	77.46	79.04	.158
47	65.21	66.80	68.39	69.98	71.57	73.16	74.75	76.34	77.93	79.51	.159
48	65.60	67.20	68.80	70.40	72.00	73.60	75.19	76.79	78.39	79.99	.160
49	65.99	67.60	69.21	70.82	72.42	74.03	75.64	77.25	78.86	80.46	.161
50	66.38	68.00	69.62	71.23	72.85	74.47	76.09	77.70	79.32	80.94	.162
51	66.77	68.40	70.03	71.65	73.28	74.91	76.53	78.16	79.79	81.41	.163
52	67.16	68.80	70.43	72.07	73.71	75.34	76.98	78.62	80.25	81.89	.164
53	67.55	69.20	70.84	72.49	74.13	75.78	77.43	79.07	80.72	82.36	.165
54	67.94	69.60	71.25	72.91	74.56	76.22	77.87	79.53	81.18	82.84	.166
55	68.33	70.00	71.66	73.33	74.99	76.66	78.32	79.98	81.65	83.31	.167
56	68.72	70.40	72.07	73.74	75.42	77.09	78.77	80.44	82.12	83.79	.167
57	69.11	70.79	72.48	74.16	75.84	77.53	79.21	80.90	82.58	84.26	.168
58	69.50	71.19	72.89	74.58	76.27	77.97	79.66	81.35	83.05	84.74	.169
59	69.90	71.59	73.30	75.00	76.70	78.40	80.11	81.81	83.51	85.21	.170
60	70.28	71.99	73.70	75.42	77.13	78.84	80.55	82.27	83.98	85.69	.171

Angle.	510	520	530	540	550	560	570	580	590	600	D
2° o′	58.33	59.47	60.61	61.76	62.90	64.04	65.18	66.33	67.47	68.61	.114
1	58.81	59.96	61.12	62.27	63.42	64.57	65.73	66.88	68.03	69.18	.115
2	59.30	60.46	61.62	62.78	63.94	65.11	66.27	67.43	68.59	69.75	.116
3	59.78	60.95	62.12	63.29	64.47	65.64	66.81	67.98	69.1[illegible]	70.32	.117
4	60.27	61.45	62.63	63.81	64.99	66.17	67.35	68.53	69.71	70.89	.118
5	60.75	61.94	63.13	64.32	65.51	66.70	67.89	69.08	70.27	71.46	.119
6	61.23	62.43	63.63	64.83	66.03	67.23	68.43	69.63	70.83	72.03	.120
7	61.72	62.93	64.14	65.35	66.56	67.77	68.97	70.18	71.39	72.60	.121
8	62.20	63.42	64.64	65.86	67.08	68.30	69.52	70.73	71.95	73.17	.122
9	62.69	63.92	65.15	66.37	67.60	68.83	70.06	71.29	72.51	73.74	.123
10	63.17	64.41	65.65	66.89	68.12	69.36	70.60	71.84	73.07	74.31	.124
11	63.66	64.90	66.15	67.40	68.65	69.89	71.14	72.39	73.64	74.88	.124
12	64.14	65.40	66.66	67.91	69.17	70.43	71.68	72.94	74.20	75.45	.125
13	64.63	65.89	67.16	68.43	69.69	70.96	72.22	73.49	74.76	76.02	.126
14	65.11	66.38	67.66	68.94	70.21	71.49	72.77	74.04	75.32	76.59	.127
15	65.60	66.88	68.17	69.45	70.74	72.02	73.31	74.59	75.88	77.16	.128
16	66.08	67.37	68.67	69.96	71.27	72.55	73.85	75.14	76.44	77.73	.129
17	66.57	67.87	69.17	70.48	71.78	73.09	74.39	75.69	77.00	78.30	.130
18	67.05	68.36	69.68	70.99	72.30	73.62	74.93	76.25	77.56	78.87	.131
19	67.53	68.85	70.18	71.50	72.83	74.15	75.47	76.80	78.12	79.44	.132
20	68.02	69.35	70.68	72.02	73.35	74.68	76.01	77.35	78.68	80.01	.133
21	68.50	69.84	71.19	72.53	73.87	75.21	76.56	77.90	79.25	80.58	.134
22	68.99	70.34	71.69	73.04	74.39	75.75	77.10	78.45	79.80	81.15	.135
23	69.49	70.83	72.20	73.56	74.92	76.28	77.64	79.00	80.36	81.72	.136
24	69.96	71.32	72.70	74.07	75.44	76.81	78.18	79.55	80.92	82.29	.137
25	70.44	71.82	73.20	74.58	75.96	77.34	78.72	80.10	81.48	82.86	.138
26	70.93	72.31	73.71	75.09	76.48	77.87	79.26	80.65	82.04	83.43	.139
27	71.41	72.81	74.21	75.61	77.01	78.41	79.81	81.20	82.60	84.00	.140
28	71.90	73.30	74.71	76.12	77.53	78.94	80.35	81.76	83.16	84.57	.141
29	72.38	73.79	75.22	76.63	78.05	79.47	80.89	82.31	83.72	85.14	.142
30	72.86	74.29	75.72	77.15	78.57	80.00	81.43	82.86	84.29	85.71	.143
31	73.35	74.78	76.22	77.66	79.10	80.53	81.97	83.41	84.85	86.28	.144
32	73.83	75.28	76.73	78.17	79.62	81.07	82.51	83.96	85.41	86.85	.145
33	74.32	75.77	77.23	78.69	80.14	81.60	83.05	84.51	85.97	87.42	.146
34	74.80	76.26	77.73	79.20	80.67	82.13	83.60	85.06	86.53	87.99	.147
35	75.29	76.76	78.24	79.71	81.19	82.66	84.14	85.61	87.09	88.56	.148
36	75.77	77.25	78.74	80.23	81.71	83.19	84.68	86.16	87.65	89.13	.148
37	76.26	77.75	79.25	80.74	82.24	83.73	85.22	86.72	88.21	89.70	.149
38	76.74	78.24	79.75	81.25	82.76	84.26	85.76	87.27	88.77	90.27	.150
39	77.23	78.74	80.25	81.76	83.28	84.79	86.30	87.82	89.33	90.84	.151
40	77.71	79.23	80.76	82.28	83.80	85.32	86.85	88.37	89.89	91.41	.152
41	78.19	79.72	81.26	82.79	84.32	85.86	87.39	88.92	90.45	91.98	.153
42	78.68	80.23	81.76	83.30	84.85	86.39	87.93	89.47	91.01	92.55	.154
43	79.26	80.71	82.27	83.82	85.37	86.92	88.47	90.02	91.57	93.12	.155
44	79.65	81.21	82.77	84.33	85.89	87.45	89.01	90.57	92.13	93.69	.156
45	80.13	81.70	83.27	84.84	86.41	87.98	89.55	91.12	92.69	94.26	.157
46	80.62	82.19	83.78	85.36	86.94	88.52	90.09	91.67	93.25	94.83	.158
47	81.10	82.69	84.28	85.87	87.46	89.05	90.64	92.23	93.81	95.40	.159
48	81.59	83.18	84.78	86.38	87.98	89.58	91.18	92.78	94.37	95.97	.160
49	82.07	83.68	85.29	86.90	88.51	90.11	91.72	93.33	94.94	95.54	.161
50	82.56	84.17	85.79	87.41	89.03	90.64	92.26	93.88	95.50	97.11	.162
51	83.04	84.66	86.29	87.92	89.55	91.18	92.80	94.43	96.06	97.68	.163
52	83.52	85.16	86.80	88.43	90.07	91.71	93.34	94.98	96.62	98.25	.164
53	84.01	85.65	87.30	88.95	90.60	92.24	93.89	95.53	97.18	98.82	.165
54	84.49	86.15	87.81	89.46	91.12	92.77	94.43	96.08	97.74	99.39	.166
55	84.98	86.64	88.31	89.97	91.64	93.30	94.97	96.63	98.30	99.96	.167
56	85.46	87.13	88.81	90.49	92.16	93.84	95.51	97.19	98.86	100.53	.167
57	85.95	87.63	89.32	91.00	92.69	94.37	96.05	97.74	99.42	101.10	.168
58	86.43	88.12	89.82	91.51	93.21	94.90	96.59	98.29	99.98	101.67	.169
59	86.92	88.62	90.32	92.03	93.74	95.43	97.13	98.84	100.54	102.24	.170
60	87.40	89.11	90.83	92.54	93.25	95.96	97.68	99.39	101.10	102.81	.171

Angle.	10	20	30	40	50	60	70	80	90	100	D
3° 0′	1.79	3.50	5.21	6.92	8.63	10.35	12.06	13.77	15.48	17.20	.171
1	1.80	3.52	5.24	6.96	8.68	10.40	12.13	13.85	15.57	17.29	.172
2	1.81	3.54	5.27	7.00	8.73	10.46	12.19	13.92	15.66	17.39	.173
3	1.82	3.56	5.30	7.04	8.78	10.52	12.26	14.00	15.74	17.48	.174
4	1.83	3.58	5.33	7.08	8.83	10.58	12.33	14.08	15.8	17.58	.175
5	1.83	3.59	5.35	7.11	8.87	10.63	12.39	14.15	15.91	17.67	.176
6	1.84	3.61	5.38	7.15	8.92	10.69	12.46	14.23	16.00	17.77	.177
7	1.85	3.63	5.41	7.19	8.97	10.75	12.53	14.30	16.08	17.86	.178
8	1.86	3.65	5.44	7.23	9.02	10.80	12.59	14.38	16.17	17.96	.179
9	1.87	3.67	5.47	7.27	9.06	10.86	12.66	14.46	16.25	18.05	.180
10	1.88	3.69	5.50	7.31	9.11	10.92	12.73	14.53	16.34	18.15	.181
11	1.89	3.71	5.53	7.34	9.16	10.98	12.79	14.61	16.43	18.24	.182
12	1.90	3.73	5.56	7.38	9.21	11.03	12.86	14.68	16.51	18.34	.183
13	1.91	3.75	5.58	7.42	9.26	11.09	12.93	14.76	16.60	18.43	.184
14	1.92	3.77	5.61	7.46	9.30	11.15	12.99	14.84	16.68	18.53	.185
15	1.93	3.79	5.64	7.50	9.35	11.20	13.06	14.91	16.77	18.62	.186
16	1.94	3.81	5.67	7.53	9.40	11.26	13.13	14.99	16.85	18.72	.187
17	1.95	3.83	5.70	7.57	9.45	11.32	13.19	15.07	16.94	18.81	.187
18	1.96	3.85	5.73	7.61	9.49	11.38	13.26	15.14	17.02	18.91	.188
19	1.97	3.87	5.76	7.65	9.54	11.43	13.33	15.22	17.11	19.00	.189
20	1.98	3.88	5.79	7.69	9.59	11.49	13.39	15.29	17.19	19.10	.190
21	1.99	3.90	5.81	7.73	9.64	11.55	13.46	15.37	17.28	19.19	.191
22	2.00	3.92	5.84	7.76	9.68	11.60	13.53	15.45	17.37	19.29	.192
23	2.01	3.94	5.87	7.80	9.73	11.66	13.59	15.52	17.45	19.38	.193
24	2.02	3.96	5.90	7.84	9.78	11.72	13.66	15.60	17.54	19.48	.194
25	2.03	3.98	5.93	7.88	9.83	11.78	13.73	15.67	17.62	19.57	.195
26	2.04	4.00	5.96	7.92	9.88	11.83	13.79	15.75	17.71	19.67	.196
27	2.05	4.02	5.99	7.96	9.92	11.89	13.86	15.83	17.79	19.76	.197
28	2.06	4.04	6.02	7.99	9.97	11.95	13.93	15.90	17.88	19.86	.198
29	2.07	4.06	6.04	8.03	10.02	12.00	13.99	15.98	17.96	19.95	.199
30	2.08	4.08	6.07	8.07	10.07	12.06	14.06	16.05	18.05	20.05	.200
31	2.09	4.10	6.10	8.11	10.11	12.12	14.12	16.13	18.14	20.14	.201
32	2.10	4 12	6.13	8.15	10.16	12.18	14.19	16.21	18.22	20.24	.202
33	2.11	4.14	6.16	8.18	10.21	12.23	14.26	16.28	18.31	20.33	.203
34	2.12	4.16	6.19	8.22	10.26	12.29	14.32	16.36	18.39	20.43	.204
35	2.13	4.17	6.22	8.26	10.30	12.35	14.39	16.43	18.48	20.52	.204
36	2.14	4.19	6.25	8.30	10.35	12.41	14.46	16.51	18.56	20.62	.205
37	2.15	4.21	6.28	8.34	10.40	12.46	14.52	16.59	18.65	20.71	.206
38	2.16	4.23	6.30	8.38	10.45	12.52	14.59	16.66	18.73	20.81	.207
39	2.17	4.25	6.33	8.41	10.50	12.58	14.66	16.74	18.82	20.90	.208
40	2.18	4.27	6.36	8.45	10.54	12.63	14.72	16.82	18.91	21.00	.209
41	2.19	4.29	6.39	8.49	10.59	12.69	14.79	16.89	18.99	21.09	.210
42	2.20	4.31	6.42	8.53	10.64	12.75	14.86	16.97	19.08	21.19	.211
43	2.21	4.33	6.45	8.57	10.69	12.81	14.92	17.04	19.16	21.28	.212
44	2.22	4.35	6.48	8.61	10.73	12.86	14.99	17.12	19.25	21.38	.213
45	2.23	4.37	6.51	8.64	10.78	12.92	15.06	17.20	19.33	21.47	.214
46	2.24	4.39	6.53	8.68	10.83	12.98	15.12	17.27	19.42	21.57	.215
47	2.25	4.41	6.56	8.72	10.88	13.03	15.19	17.35	19.50	21.66	.216
48	2.26	4.43	6.59	8.76	10.92	13.09	15.27	17.42	19.59	21.76	.217
49	2.27	4.45	6.62	8.80	10.97	13.15	15.32	17.50	19.68	21.85	.218
50	2.28	4.46	6.65	8.83	11.02	13.21	15.39	17.58	19.76	21.95	.219
51	2.29	4.48	6.68	8.87	11.07	13.26	15.46	17.65	19.85	22.04	.220
52	2.30	4.50	6.71	8.91	11.12	13.32	15.52	17.73	19.93	22.14	.221
53	2.31	4.52	6.74	8.95	11.16	13.38	15.59	17.81	20.02	22.23	.222
54	2.32	4.54	6.76	8.99	11.21	13.43	15.66	17.80	20.10	22.33	.222
55	2.33	4.56	6.79	9.03	11.26	13.49	15.72	17.96	20.19	22.42	.223
56	2.34	4.58	6.82	9.06	11.31	13.55	15.79	18.03	20.27	22.52	.224
57	2.35	4.60	6.85	9.10	11.35	13.61	15.86	18.11	20.36	22.61	.225
58	2.36	4.62	6.88	9.14	11.40	13.66	15.92	18.18	20.45	22.71	.226
59	2.37	4.64	6.91	9.18	11.45	13.72	15.99	18.26	20.53	22.80	.227
60	2.38	4.66	6.94	9.22	11.50	13.78	16.06	18.34	20.62	22.90	.228

Angle.	110	120	130	140	150	160	170	180	190	200	D
3° 0′	18.91	20.62	22.33	24.05	25.76	27.47	29.18	30.90	32.61	34.32	.171
1	19.01	20.74	22.46	24.18	25.90	27.62	29.34	31.07	32.79	34.51	.172
2	19.12	20.85	22.58	24.31	26.04	27.77	29.51	31.24	32.97	34.70	.173
3	19.22	20.96	22.70	24.44	26.19	27.93	29.67	31.41	33.15	34.89	.174
4	19.33	21.08	22.83	24.58	26.33	28.08	29.83	31.58	33.33	35.08	.175
5	19.43	21.19	22.95	24.71	26.47	28.23	29.99	31.75	33.51	35.27	.176
6	19.54	21.30	23.07	24.84	26.61	28.38	30.15	31.92	33.69	35.46	.177
7	19.64	21.42	23.20	24.98	26.75	28.53	30.31	32.09	33.87	35.65	.178
8	19.74	21.53	23.32	25.11	26.90	28.68	30.47	32.26	34.05	35.84	.179
9	19.85	21.65	23.44	25.24	27.04	28.84	30.63	32.43	34.23	36.03	.180
10	19.96	21.76	23.57	25.37	27.18	28.99	30.80	32.60	34.41	36.22	.181
11	20.06	21.87	23.69	25.51	27.32	29.14	30.96	32.77	34.59	36.41	.182
12	20.16	21.98	23.81	25.64	27.47	29.29	31.12	32.94	34.77	36.60	.183
13	20.27	22.10	23.94	25.77	27.61	29.44	31.28	33.11	34.95	36.78	.184
14	20.37	22.22	24.06	25.91	27.75	29.60	31.44	33.28	35.13	36.97	.185
15	20.48	22.33	24.18	26.04	27.89	29.75	31.60	33.46	35.31	37.16	.186
16	20.58	22.44	24.31	26.17	28.03	29.90	31.76	33.63	35.49	37.35	.187
17	20.68	22.56	24.43	26.30	28.18	30.05	31.92	33.80	35.67	37.54	.187
18	20.79	22.67	24.55	26.44	28.32	30.20	32.08	33.97	35.85	37.73	.188
19	20.89	22.79	24.68	26.57	28.46	30.35	32.25	34.14	36.03	37.92	.189
20	21.00	22.90	24.80	26.70	28.60	30.51	32.41	34.31	36.21	38.11	.190
21	21.10	23.01	24.92	26.84	28.75	30.66	32.57	34.48	36.39	38.30	.191
22	21.21	23.13	25.05	26.97	28.89	30.81	32.73	34.65	36.57	38.49	.192
23	21.31	23.24	25 17	27.10	29.03	30.96	32.89	34.82	36.75	38.68	.193
24	21.42	23.36	25 29	27.23	29.17	31.11	33.05	34.99	36.93	38.87	.194
25	21.52	23.47	25 42	27.37	29.32	31.26	33.21	35.16	37.11	39.06	.195
26	21.62	23.58	25 54	27.50	29.46	31.42	33.37	35.33	37.29	39.25	.196
27	21.73	23.70	25 66	27.63	29.60	31.57	33.54	35.50	37.47	39.44	.197
28	21.83	23.81	25 79	27.77	29.74	31.72	33.70	35.67	37.65	39.63	.198
29	21.94	23.92	25 91	27.90	29.88	31.87	33.86	35.84	37.83	39.82	.199
30	22.04	24.04	26 03	28.03	30.03	32.02	34.02	36.02	38.01	40.01	.200
31	22.15	24.15	26 16	28.16	30.17	32.17	34.18	36.19	38.19	40.20	.201
32	22.25	24.27	26 28	28.30	30.31	32.33	34.34	36.36	38.37	40.39	.202
33	22.36	24.38	26 40	28.43	30.45	32.48	34.50	36.53	38.55	40.58	.203
34	22.46	24.49	26 53	28.56	30.60	32.63	34.66	36.70	38.73	40.77	.204
35	22.56	24.61	26 65	28.70	30.74	32.79	34.83	36.87	38.91	40.96	.204
36	22.67	24.72	26 77	28.83	30.88	32.93	34.99	37.04	39.09	41.15	.205
37	22.77	24.84	26 90	28.96	31.02	33.09	35.15	37.21	39.27	41.33	.206
38	22.88	24.95	27 02	29.09	31.17	33.24	35.31	37.38	39.45	41.52	.207
39	22.98	25.06	27 14	29.23	31.31	33.39	35.47	37.55	39.63	41.71	.208
40	23.09	25.18	27 27	29.36	31.45	33.54	35.63	37.72	39.81	41.90	.209
41	23.19	25.29	27 39	29.49	31.59	33.69	35.79	37.89	39.99	42.09	.210
42	23.30	25.41	27 51	29.62	31.73	33.84	35.95	38.06	40.17	42.28	.211
43	23.40	25.52	27 64	29.76	31.88	34.00	36.11	38.23	40.35	42.47	.212
44	23.50	25.63	27 76	29.89	32.02	34.15	36.28	38.40	40.53	42.66	.213
45	23.61	25.75	27 88	30.02	32.16	34.30	36.44	38.58	40.71	42.85	.214
46	23.71	25.86	28 01	30.16	32.30	34.45	36.60	38.75	40.89	43.04	.215
47	23.82	25.98	28 13	30.29	32.45	34.60	36.76	38.92	41.07	43.23	.216
48	23.92	26.09	28 25	30.42	32.59	34.75	36.92	39.09	41.25	43.42	.217
49	24.03	26.20	28 38	30.55	32.73	34.91	37.08	39.26	41.43	43.61	.218
50	24.13	26.32	28 50	30.69	32.87	35.06	37.24	39.43	41.61	43.80	.219
51	24.24	26.43	28 62	30.82	33.01	35.21	37.40	39.60	41.79	43.99	.220
52	24.34	26.54	28 75	30.95	33.16	35.36	37.57	39.77	41.97	44.18	.221
53	24.44	26.66	28 87	31.09	33.30	35.51	37.73	39.94	42.15	44.37	.222
54	24.55	26.77	28 99	31.22	33.44	35.66	37.89	40.11	42.33	44.56	.222
55	24.65	26.89	29 12	31.35	33.58	35.82	38.05	40.28	42.51	44.75	.223
56	24.76	27.00	29 24	31.48	33.73	35.97	38.21	40.45	42.69	44.94	.224
57	24.86	27.11	29.36	31.62	33.87	36.12	38.37	40.62	42.87	45.13	.225
58	24.97	27.23	29.49	31.75	34.01	36.27	38.53	40.79	43.05	45.32	.226
59	25.07	27.34	29.61	31.88	34.15	36.42	38.69	40.96	43.23	45.51	.227
60	25.18	27.46	29.74	32.02	34.30	36.58	38.86	41.14	43.42	45.70	.228

Angle.	210	220	230	240	250	260	270	280	290	300	D
3° 0′	36.03	37.74	39.46	41.17	42.88	44.59	46.31	48.02	49.73	51.44	.171
1	36.23	37.95	39.68	41.40	43.12	44.84	46.56	48.28	50.01	51.73	.172
2	36.43	38.16	39.89	41.62	43.36	45.09	46.82	48.55	50.28	52.01	.173
3	36.63	38.37	40.11	41.85	43.59	45.33	47.07	48.81	50.55	52.30	.174
4	36.83	38.58	40.33	42.08	43.83	45.58	47.33	49.08	50.83	52.58	.175
5	37.03	38.79	40.55	42.31	44.07	45.83	47.59	49.35	51.10	52.86	.176
6	37.23	39.00	40.76	42.53	44.30	46.07	47.84	49.61	51.38	53.15	.177
7	37.43	39.20	40.98	42.76	44.54	46.32	48.10	49.88	51.65	53.43	.178
8	37.62	39.41	41.20	42.99	44.78	46.56	48.35	50.14	51.93	53.72	.179
9	37.82	39.62	41.42	43.21	45.01	46.81	48.61	50.41	52.20	54.00	.180
10	38.02	39.83	41.64	43.44	45.25	47.06	48.86	50.67	52.48	54.29	.181
11	38.22	40.04	41.85	43.67	45.49	47.30	49.12	50.94	52.75	54.57	.182
12	38.42	40.25	42.07	43.90	45.72	47.55	49.38	51.20	53.03	54.85	.183
13	38.62	40.46	42.29	44.13	45.96	47.80	49.63	51.47	53.30	55.14	.184
14	38.82	40.66	42.51	44.35	46.20	48.04	49.89	51.73	53.57	55.42	.185
15	39.02	40.87	42.73	44.58	46.43	48.29	50.14	52.00	53.85	55.71	.186
16	39.22	41.08	42.94	44.81	46.67	48.54	50.40	52.26	54.12	55.99	.187
17	39.42	41.29	43.16	45.04	46.91	48.78	50.65	52.53	54.40	56.27	.187
18	39.62	41.50	43.38	45.26	47.15	49.03	50.91	52.79	54.67	56.56	.188
19	39.81	41.71	43.60	45.49	47.38	49.28	51.17	53.06	54.95	56.84	.189
20	40.01	41.91	43.82	45.72	47.62	49.52	51.42	53.32	55.22	57.13	.190
21	40.21	42.12	44.03	45.95	47.86	49.77	51.68	53.59	55.50	57.41	.191
22	40.41	42.33	44.25	46.17	48.09	50.01	51.93	53.85	55.77	57.70	.192
23	40.61	42.54	44.47	46.40	48.33	50.26	52.19	54.12	56.05	57.98	.193
24	40.81	42.75	44.69	46.63	48.57	50.51	52.45	54.38	56.32	58.26	.194
25	41.01	42.96	44.91	46.85	48.80	50.75	52.70	54.65	56.59	58.54	.195
26	41.21	43.17	45.12	47.08	49.04	51.00	52.96	54.92	56.87	58.83	.196
27	41.42	43.37	45.34	47.31	49.28	51.25	53.21	55.18	57.14	59.12	.197
28	41.61	43.58	45.56	47.54	49.51	51.49	53.47	55.45	57.42	59.40	.198
29	41.80	43.79	45.78	47.76	49.75	51.74	53.72	55.71	57.69	59.68	.199
30	42.00	44.00	46.00	47.99	49.99	51.98	53.98	55.98	57.97	59.97	.200
31	42.20	44.21	46.21	48.22	50.23	52.23	54.24	56.24	58.24	60.25	.201
32	42.40	44.42	46.43	48.45	50.46	52.48	54.49	56.51	58.52	60.54	.202
33	42.60	44.63	46.65	48.67	50.70	52.72	54.75	56.77	58.79	60.82	.203
34	42.80	44.83	46.87	48.90	50.94	52.97	55.00	57.04	59.07	61.11	.204
35	43.00	45.04	47.09	49.13	51.17	53.22	55.26	57.30	59.34	61.39	.204
36	43.20	45.25	47.30	49.36	51.41	53.46	55.52	57.57	59.61	61.67	.205
37	43.40	45.46	47.52	49.58	51.65	53.71	55.77	57.83	59.89	61.96	.206
38	43.60	45.67	47.74	49.81	51.88	53.95	56.03	58.10	60.16	62.24	.207
39	43.80	45.88	47.96	50.04	52.12	54.20	56.28	58.36	60.44	62.53	.208
40	43.99	46.08	48.18	50.27	52.36	54.45	56.54	58.63	60.71	62.81	.209
41	44.19	46.29	48.39	50.49	52.59	54.69	56.79	58.89	60.99	63.09	.210
42	44.39	46.50	48.61	50.72	52.83	54.94	57.04	59.16	61.26	63.38	.211
43	44.59	46.71	48.83	50.95	53.07	55.19	57.30	59.42	61.53	63.66	.212
44	44.79	46.92	49.05	51.18	53.30	55.43	57.55	59.69	61.81	63.95	.213
45	44.99	47.13	49.27	51.40	53.54	55.68	57.81	59.96	62.09	64.23	.214
46	45.19	47.34	49.48	51.63	53.78	55.93	58.06	60.22	62.36	64.52	.215
47	45.39	47.54	49.70	51.86	54.02	56.17	58.33	60.49	62.63	64.80	.216
48	45.59	47.75	49.92	52.09	54.25	56.42	58.58	60.75	62.91	65.08	.217
49	45.79	47.96	50.14	52.31	54.49	56.66	58.84	61.02	63.18	65.37	.218
50	45.98	48.17	50.36	52.54	54.73	56.91	59.10	61.28	63.46	65.65	.219
51	46.18	48.38	50.57	52.77	54.96	57.16	59.35	61.55	63.73	65.94	.220
52	46.38	48.59	50.79	53.00	55.20	57.40	59.61	61.81	64.01	66.22	.221
53	46.58	48.80	51.01	53.22	55.44	57.65	59.86	62.08	64.28	66.50	.222
54	46.78	49.00	51.23	53.46	55.67	57.90	60.12	62.34	64.56	66.79	.222
55	46.98	49.21	51.44	53.68	55.91	58.14	60.38	62.61	64.83	67.07	.223
56	47.18	49.42	51.66	53.90	56.15	58.39	60.63	62.87	65.11	67.36	.224
57	47.38	49.63	51.88	54.13	56.38	58.63	60.89	63.14	65.38	67.64	.225
58	47.58	49.84	52.10	54.36	56.62	58.88	61.14	63.40	65.65	67.93	.226
59	47.78	50.05	52.32	54.59	56.86	59.13	61.40	63.67	65.93	68.21	.227
60	47.98	50.25	52.53	54.81	57.09	59.37	61.65	63.93	66.20	68.49	.228

Angle.	310	320	330	340	350	360	370	380	390	400	D
3° 0′	53.16	54.87	56.58	58.29	60.01	61.72	63.43	65.14	66.85	68.57	.171
1	53.45	55.17	56.89	58.61	60.34	62.06	63.78	65.50	67.22	68.95	.172
2	53.74	55.47	57.21	58.94	60.67	62.40	64.13	65.86	67.59	69.32	.173
3	54.04	55.78	57.52	59.26	61.00	62.74	64.48	66.22	67.96	69.70	.174
4	54.33	56.08	57.83	59.58	61.33	63.08	64.83	66.58	68.33	70.08	.175
5	54.62	56.38	58.14	59.90	61.66	63.42	65.18	66.94	68.70	70.46	.176
6	54.92	56.69	58.46	60.22	61.99	63.76	65.53	67.30	69.07	70.84	.177
7	55.21	56.99	58.77	60.55	62.33	64.10	65.88	67.66	69.44	71.22	.178
8	55.50	57.29	59.08	60.87	62.66	64.44	66.23	68.02	69.81	71.60	.179
9	55.80	57.60	59.39	61.19	62.99	64.79	66.58	68.38	70.18	71.98	.180
10	56.09	57.90	59.71	61.51	63.32	65.13	66.93	68.74	70.55	72.35	.181
11	56.39	58.20	60.02	61.83	63.65	65.47	67.28	69.10	70.92	72.73	.182
12	56.68	58.51	60.33	62.16	63.98	65.81	67.63	69.46	71.29	73.11	.183
13	56.97	58.81	60.64	62.48	64.31	66.15	67.99	69.82	71.66	73.49	.184
14	57.27	59.11	60.96	62.80	64.65	66.49	68.34	70.18	72.02	73.87	.185
15	57.56	59.41	61.27	63.12	64.98	66.83	68.69	70.54	72.39	74.25	.186
16	57.85	59.72	61.58	63.44	65.31	67.17	69.04	70.90	72.76	74.63	.187
17	58.15	60.02	61.89	63.77	65.64	67.51	69.39	71.26	73.13	75.01	.187
18	58.44	60.32	62.21	64.09	65.97	67.85	69.74	71.62	73.50	75.38	.188
19	58.73	60.63	62.52	64.41	66.30	68.19	70.09	71.98	73.87	75.76	.189
20	59.03	60.93	62.83	64.73	66.63	68.54	70.44	72.34	74.24	76.14	.190
21	59.32	61.23	63.14	65.05	66.97	68.88	70.79	72.70	74.61	76.52	.191
22	59.62	61.54	63.46	65.38	67.30	69.22	71.14	73.06	74.98	76.90	.192
23	59.91	61.84	63.77	65.70	67.63	69.56	71.49	73.42	75.35	77.28	.193
24	60.20	62.14	64.08	66.02	67.96	69.90	71.84	73.78	75.72	77.66	.194
25	60.50	62.45	64.39	66.34	68.29	70.24	72.19	74.14	76.09	78.04	.195
26	60.79	62.75	64.71	66.66	68.62	70.58	72.54	74.50	76.46	78.41	.196
27	61.08	63.05	65.02	66.99	68.95	70.92	72.89	74.86	76.83	78.79	.197
28	61.38	63.35	65.33	67.31	69.29	71.26	73.24	75.22	77.19	79.17	.198
29	61.67	63.66	65.64	67.63	69.62	71.60	73.59	75.58	77.56	79.55	.199
30	61.96	63.96	65.96	67.95	69.95	71.94	73.94	75.94	77.93	79.93	.200
31	62.26	64.26	66.27	68.27	70.28	72.29	74.29	76.30	78.30	80.31	.201
32	62.55	64.57	66.58	68.60	70.61	72.63	74.64	76.66	78.67	80.69	.202
33	62.85	64.87	66.89	68.92	70.94	72.97	74.99	77.02	79.04	81.07	.203
34	63.14	65.17	67.21	69.24	71.27	73.31	75.34	77.38	79.41	81.44	.204
35	63.43	65.48	67.52	69.57	71.61	73.65	75.69	77.74	79.78	81.82	.204
36	63.73	65.78	67.83	69.88	71.94	73.99	76.04	78.10	80.15	82.20	.205
37	64.02	66.08	68.14	70.21	72.27	74.33	76.39	78.46	80.52	82.58	.206
38	64.31	66.39	68.46	70.53	72.60	74.67	76.75	78.82	80.89	82.96	.207
39	64.61	66.69	68.77	70.85	72.93	75.01	77.10	79.18	81.26	83.34	.208
40	64.90	66.99	69.08	71.17	73.26	75.35	77.45	79.54	81.63	83.72	.209
41	65.19	67.29	69.39	71.49	73.60	75.69	77.80	79.90	82.00	84.10	.210
42	65.49	67.60	69.71	71.82	73.93	76.04	78.15	80.26	82.37	84.47	.211
43	65.78	67.90	70.02	72.14	74.26	76.38	78.50	80.62	82.73	84.85	.212
44	66.08	68.20	70.33	72.46	74.59	76.72	78.85	80.98	83.10	85.23	.213
45	66.37	68.51	70.64	72.78	74.92	77.06	79.20	81.33	83.47	85.61	.214
46	66.66	68.81	70.96	73.10	75.25	77.40	79.55	81.69	83.84	85.99	.215
47	66.96	69.11	71.27	73.43	75.58	77.74	79.90	82.05	84.21	86.37	.216
48	67.25	69.42	71.58	73.75	75.93	78.08	80.25	82.41	84.58	86.75	.217
49	67.54	69.72	71.89	74.07	76.25	78.42	80.60	82.77	84.95	87.13	.218
50	67.84	70.02	72.20	74.39	76.58	78.76	80.95	83.13	85.32	87.50	.219
51	68.13	70.33	72.52	74.71	76.91	79.10	81.30	83.49	85.69	87.88	.220
52	68.42	70.63	72.83	75.04	77.24	79.44	81.65	83.85	86.06	88.26	.221
53	68.72	70.93	73.15	75.36	77.57	79.79	82.00	84.21	86.43	88.64	.222
54	69.01	71.23	73.46	75.68	77.90	80.13	82.35	84.57	86.80	89.02	.222
55	69.30	71.54	73.77	76.00	78.24	80.47	82.70	84.93	87.17	89.40	.223
56	69.60	71.84	74.08	76.32	78.57	80.81	83.05	85.29	87.54	89.78	.224
57	69.89	72.14	74.40	76.65	78.90	81.15	83.40	85.65	87.90	90.16	.225
58	70.19	72.45	74.71	76.97	79.23	81.49	83.75	86.01	88.27	90.53	.226
59	70.48	72.75	75.02	77.29	79.56	81.83	84.10	86.37	88.64	90.91	.227
60	70.77	73.05	75.33	77.61	79.89	82.17	84.45	86.73	89.01	91.29	.228

Angle.	410	420	430	440	450	460	470	480	490	500	D
3° 0′	70.28	72.00	73.70	75.42	77.13	78.84	80.55	82.27	83.98	85.69	.171
1	70.67	72.39	74.11	75.83	77.55	79.28	81.00	82.72	84.44	86.16	.172
2	71.06	72.79	74.52	76.25	77.98	79.71	81 44	83.17	84.91	86.64	.173
3	71.44	73.18	74.93	76.67	78.41	80.15	81.89	83.63	85.37	87.11	.174
4	71.83	73.58	75.33	77.08	78.83	80.58	82.33	84.08	85.83	87.58	.175
5	72.22	73.98	75.74	77.50	79.26	81.02	82.78	84.54	86.30	88.06	.176
6	72.61	74.38	76.15	77.92	79.68	81.45	83.22	84.99	86.76	88.53	.177
7	73.00	74.78	76.55	78.33	80.11	81.89	83.67	85.45	87.23	89.00	.178
8	73.38	75.17	76.96	78.75	80.54	82.32	84.11	85.90	87.69	89.48	.179
9	73.77	75.57	77.37	79.17	80.96	82.76	84.56	86.36	88.15	89.95	.180
10	74.16	75.97	77.78	79.58	81.39	83.20	85.00	86.81	88.62	90.42	.181
11	74.55	76.37	78.18	80.00	81.82	83.63	85.45	87.26	89.08	90.90	.182
12	74.94	76.76	78.59	80.42	82.24	84.07	85.89	87.72	89.54	91.37	.183
13	75.33	77.16	79.00	80.83	82.67	84.50	86.34	88.17	90.00	91.84	.184
14	75.71	77.56	79.40	81.25	83.09	84.94	86.78	88.63	90.47	92.32	.185
15	76.10	77.96	79.81	81.67	83.52	85.37	87.23	89.08	90.94	92.79	.186
16	76.49	78.35	80.22	82.08	83.95	85.81	87.67	89.54	91.40	93.26	.187
17	76.88	78.75	80.63	82.50	84.37	86.24	88.12	90.00	91.86	93.74	.187
18	77.27	79.15	81.03	82.91	84.80	86.68	88.56	90.45	92.33	94.21	.188
19	77.65	79.55	81.44	83.33	85.22	87.12	89.01	90.90	92.79	94.68	.189
20	78.04	79.95	81.85	83.75	85.65	87.55	89.45	91.35	93.26	95.16	.190
21	78.43	80.34	82.25	84.17	86.08	87.99	89.90	91.81	93.72	95.63	.191
22	78.82	80.74	82.66	84.58	86.50	88.42	90.34	92.26	94.18	96.10	.192
23	79.21	81.14	83.07	85.00	86.93	88.86	90.79	92.72	94.65	96.58	.193
24	79.60	81.54	83.47	85.41	87.35	89.29	91.23	93.17	95.11	97.05	.194
25	79.98	81.93	83.88	85.83	87.78	89.73	91.68	93.63	95.58	97.52	.195
26	80.37	82.33	84.29	86.25	88.21	90.16	92.12	94.08	96.04	98.00	.196
27	80.76	82.73	84.70	86.66	88.63	90.60	92.57	94.54	96.50	98.47	.197
28	81.15	83.13	85.10	87.08	89.06	91.03	93.01	94.99	96.97	98.94	.198
29	81.53	83.52	85.51	87.50	89.48	91.47	93.46	95.44	97.43	99.44	.199
30	81.93	83.92	85.92	87.91	89.91	91.91	93.90	95.90	97.89	99.89	.200
31	82.31	84.32	86.32	88.33	90.34	92.34	94.35	96.35	98.36	100.36	.201
32	82.70	84.72	86.73	88.75	90.76	92.78	94.79	96.81	98.82	100.84	.202
33	83.09	85.11	87.14	89.16	91.19	93.21	95.24	97.26	99.29	101.31	.203
34	83.48	85.51	87.55	89.58	91.61	93.65	95.68	97.72	99.75	101.78	.204
35	83.87	85.91	87.95	90.00	92.04	94.08	96.13	98.17	100.21	102.26	.204
36	84.25	86.31	88.36	90.41	92.47	94.52	96.57	98.63	100.68	102.73	.205
37	84.64	86.71	88.77	90.83	92.89	94.95	97.02	99.08	101.14	103.20	.206
38	85.03	87.10	89.17	91.25	93.32	95.39	97.46	99.53	101.61	103.68	.207
39	85.42	87.50	89.58	91.66	93.74	95.83	97.91	99.99	102.07	104.15	.208
40	85.81	87.90	89.99	92.08	94.17	96.26	98.35	100.44	102.53	104.62	.209
41	86.20	88.30	90.40	92.50	94.60	96.70	98.80	100.90	103.00	105.10	.210
42	86.58	88.69	90.80	92.91	95.02	97.13	99.24	101.35	103.46	105.57	.211
43	86.97	89.09	91.21	93.33	95.45	97.57	99.69	101.81	103.93	106.04	.212
44	87.36	89.49	91.62	93.75	95.87	98.00	100.13	102.26	104.39	106.52	.213
45	87.75	89.89	92.02	94.16	96.30	98.44	100.58	102.71	104.85	107.00	.214
46	88.14	90.28	92.43	94.58	96.73	98.87	101.02	103.17	105.32	107.46	.215
47	88.52	90.68	92.84	95.00	97.15	99.31	101.47	103.62	105.78	107.94	.216
48	88.91	91.08	93.25	95.41	97.58	99.74	101.91	104.08	106.24	108.41	.217
49	89.30	91.48	93.65	95.83	98.00	100.18	102.36	104.53	106.71	108.88	.218
50	89.69	91.88	94.06	96.25	98.43	100.62	102.80	104.99	107.17	109.36	.219
51	90.08	92.27	94.47	96.66	98.86	101.05	103.25	105.44	107.64	109.83	.220
52	90.47	92.67	94.87	97.08	99.28	101.49	103.69	105.90	108.10	110.30	.221
53	90.85	93.07	95.28	97.50	99.71	101.92	104.14	106.35	108.56	110.78	.222
54	91.24	93.47	95.69	97.91	100.14	102.36	104.58	106.80	109.03	111 25	.222
55	91.63	93.86	96.10	98.33	100.56	102.79	105.03	107.26	109.49	111.72	.223
56	92.02	94.26	96.50	98.75	100.99	103.23	105.47	107.71	109.96	112.20	.224
57	92.41	94.66	96.91	99.16	101.41	103.66	105.92	108.17	110.42	112.67	.225
58	92.79	95.06	97.32	99.58	101.84	104.10	106.36	108.62	110.88	113.14	.226
59	93.18	95.45	97.72	100.00	102.27	104.53	106.81	109.08	111.35	113.62	.227
60	93.57	95.85	98.13	100.41	102.69	104.97	107.25	109.53	111.81	114.09	.228

Angle.	10	20	30	40	50	60	70	80	90	100	D
4° 0′	2.38	4.66	6.94	9.22	11.50	13.78	16.07	18.34	20.62	22.90	.228
1	2.39	4.68	6.97	9.26	11.54	13.83	16.12	18.41	20.70	22.99	.229
2	2.40	4.70	6.99	9.29	11.59	13.89	16.19	18.49	20.79	23.09	.230
3	2.41	4.72	7.02	9.33	11.64	13.95	16.26	18.56	20.87	23.18	.231
4	2.42	4.73	7.05	9.37	11.69	14.00	16.32	18.64	20.96	23.27	.232
5	2.43	4.75	7.08	9.41	11.73	14.06	16.39	18.71	21.04	23.37	.233
6	2.44	4.77	7.11	9.45	11.78	14.12	16.45	18.79	21.13	23.46	.234
7	2.45	4.79	7.14	9.48	11.83	14.17	16.52	18.87	21.21	23.56	.235
8	2.46	4.81	7.17	9.52	11.88	14.23	16.59	18.94	21.30	23.65	.236
9	2.47	4.83	7.20	9.56	11.92	14.29	16.65	19.01	21.38	23.75	.237
10	2.48	4.85	7.22	9.60	11.97	14.35	16.72	19.09	21.47	23.84	.237
11	2.49	4.87	7.25	9.64	12.02	14.40	16.79	19.17	21.55	23.94	.238
12	2.50	4.89	7.28	9.67	12.07	14.46	16.85	19.24	21.64	24.03	.239
13	2.51	4.91	7.31	9.71	12.11	14.52	16.92	19.32	21.72	24.13	.240
14	2.51	4.93	7.34	9.75	12.16	14.57	16.98	19.40	21.81	24.22	.241
15	2.52	4.95	7.37	9.79	12.21	14.63	17.05	19.47	21.89	24.31	.242
16	2.53	4.97	7.40	9.83	12.26	14.69	17.12	19.55	21.98	24.41	.243
17	2.54	4.98	7.42	9.86	12.30	14.74	17.18	19.62	22.06	24.50	.244
18	2.55	5.00	7.45	9.90	12.35	14.80	17.25	19.70	22.15	24.60	.245
19	2.56	5.02	7.48	9.94	12.40	14.86	17.32	19.77	22.23	24.69	.246
20	2.57	5.04	7.51	9.98	12.45	14.91	17.38	19.85	22.32	24.79	.247
21	2.58	5.06	7.54	10.02	12.49	14.97	17.45	19.93	22.40	24.88	.248
22	2.59	5.08	7.57	10.05	12.54	15.03	17.51	20.00	22.49	24.98	.249
23	2.60	5.10	7.60	10.09	12.59	15.08	17.58	20.08	22.57	25.07	.250
24	2.61	5.12	7.62	10.13	12.64	15.14	17.65	20.15	22.66	25.17	.251
25	2.62	5.14	7.65	10.17	12.68	15.20	17.71	20.23	22.74	25.26	.252
26	2.63	5.16	7.68	10.21	12.73	15.26	17.78	20.30	22.83	25.35	.253
27	2.64	5.18	7.71	10.24	12.78	15.31	17.85	20.38	22.91	25.45	.253
28	2.65	5.20	7.74	10.28	12.83	15.37	17.91	20.46	23.00	25.54	.254
29	2.66	5.22	7.77	10.32	12.87	15.43	17.98	20.53	23.08	25.64	.255
30	2.67	5.23	7.80	10.36	12.92	15.48	18.05	20.61	23.17	25.73	.256
31	2.68	5.25	7.83	10.40	12.97	15.54	18.11	20.68	23.25	25.83	.257
32	2.69	5.27	7.85	10.43	13.02	15.60	18.18	20.76	23.34	25.92	.258
33	2.70	5.29	7.88	10.47	13.06	15.65	18.24	20.83	23.42	26.02	.259
34	2.71	5.31	7.91	10.51	13.11	15.71	18.31	20.91	23.51	26.11	.260
35	2.72	5.33	7.94	10.55	13.16	15.77	18.38	20.99	23.59	26.20	.261
36	2.73	5.35	7.97	10.59	13.21	15.82	18.44	21.06	23.68	26.30	.262
37	2.74	5.37	8.00	10.62	13.25	15.88	18.51	21.14	23.77	26.39	.263
38	2.75	5.39	8.03	10.66	13.30	15.94	18.58	21.21	23.85	26.49	.264
39	2.76	5.41	8.05	10.70	13.35	15.99	18.64	21.29	23.94	26.58	.265
40	2.77	5.43	8.08	10.74	13.40	16.05	18.71	21.36	24.02	26.68	.266
41	2.78	5.45	8.11	10.78	13.44	16.11	18.78	21.44	24.11	26.78	.267
42	2.79	5.47	8.14	10.82	13.49	16.17	18.84	21.52	24.19	26.87	.268
43	2.80	5.48	8.17	10.85	13.54	16.22	18.91	21.59	24.28	26.96	.269
44	2.81	5.50	8.20	10.89	13.59	16.28	18.97	21.67	24.36	27.06	.269
45	2.82	5.52	8.23	10.93	13.63	16.34	19.04	21.74	24.45	27.15	.270
46	2.83	5.54	8.25	10.97	13.68	16.39	19.11	21.82	24.53	27.24	.271
47	2.84	5.56	8.28	11.01	13.73	16.45	10.17	21.89	24.62	27.34	.272
48	2.85	5.58	8.31	11.04	13.78	16.51	19.24	21.97	24.70	27.43	.273
49	2.86	5.60	8.34	11.08	13.82	16.56	19.31	22.05	24.79	27.53	.274
50	2.87	5.62	8.37	11.12	13.87	16.62	19.37	22.12	24.87	27.62	.275
51	2.88	5.64	8.40	11.16	13.92	16.68	19.44	22.20	24.96	27.72	.276
52	2.89	5.66	8.43	11.20	13.96	16.73	19.51	22.27	25.04	27.81	.277
53	2.90	5.68	8.46	11.23	14.01	16.79	19.57	22.35	25.13	27.91	.278
54	2.91	5.70	8.48	11.27	14.06	16.85	19.64	22.42	25.21	28.00	.279
55	2.92	5.71	8.51	11.31	14.11	16.90	19.70	22.50	25.30	28.10	.280
56	2.93	5.73	8.54	11.35	14.15	16.96	19.77	22.57	25.38	28.19	.281
57	2.94	5.75	8.57	11.39	14.20	17.02	19.84	22.65	25.47	28.28	.282
58	2.95	5.77	8.60	11.42	14.25	17.08	19.90	22.73	25.55	28.38	.283
59	2.96	5.79	8.63	11.46	14.30	17.13	19.97	22.80	25.64	28.47	.284
60	2.97	5.81	8.66	11.50	14.34	17.19	20.03	22.88	25.72	28.57	.284

Angle.	110	120	130	140	150	160	170	180	190	200	D
4° 0′	25.18	27.46	29.74	32.02	34.30	36.58	38.86	41.14	43.42	45.70	.228
1	25.28	27.57	29.86	32.15	34.44	36.73	39.02	41.31	43.59	45.88	.229
2	25.38	27.68	29.98	32.28	34.58	36.88	39.18	41.47	43.77	46.07	.230
3	25.49	27.80	30.10	32.41	34.72	37.03	39.34	41.64	43.95	46.26	.231
4	25.59	27.91	30.23	32.54	34.86	37.18	39.50	41.81	44.13	46.45	.232
5	25 70	28.02	30.35	32.67	35.00	37.33	39.66	41.98	44.31	46.64	.233
6	25.80	28.14	30.47	32.81	35.15	37.48	39.82	42.15	44.49	46.83	.234
7	25.90	28.25	30.60	32.94	35.29	37.63	39.98	42.32	44.67	47.02	.235
8	26.01	28.36	30.72	33.07	35.43	37.78	40.14	42.49	44.85	47.20	.236
9	26.11	28.48	30.84	33.21	35.57	37.93	40.30	42.66	45.03	47.39	.237
10	26.21	28.59	30.96	33.34	35.71	38.09	40.46	42.83	45.21	47.58	.237
11	26.32	28.70	31.09	33.47	35.85	38.24	40.62	43.00	45.39	47.77	.238
12	26.42	28.82	31.21	33.60	35.99	38.39	40.78	43.17	45.57	47.96	.239
13	26.53	28.93	31.33	33.73	36.14	38.54	40.94	43.34	45.75	48.15	.240
14	26.63	29.04	31.45	33.87	36.28	38.69	41.10	43.51	45.92	48.34	.241
15	26.74	29.16	31.58	34.00	36.42	38.84	41.26	43.68	46.10	48.52	.242
16	26.84	29.27	31.70	34.13	36.56	38.99	41.42	43.85	46.28	48.71	.243
17	26.94	29.38	31.82	34.26	36.70	39.14	41.58	44.02	46.46	48.90	.244
18	27.05	29.50	31.95	34.39	36.84	39.29	41.74	44.19	46.64	49.09	.245
19	27.15	29.61	32.07	34.53	36.99	39.44	41.90	44.36	46.82	49.28	.246
20	27.26	29.72	32.19	34.66	37.13	39.60	42.06	44.53	47.00	49.47	.247
21	27.36	29.84	32.31	34.79	37.27	39.75	42.22	44.70	47.18	49.66	.248
22	27.46	29.95	32.44	34.92	37.41	39 90	42.38	44.87	47.36	49.85	.249
23	27.57	30.06	32.56	34.06	37.55	40.05	42.54	45.04	47.54	50.03	.250
24	27.67	30.18	32.68	35.19	37.69	40.20	42.71	45.21	47.72	50.22	.251
25	27.77	30.29	32.81	35.32	37.84	40.35	42.87	45.38	47.90	50.41	.252
26	27.88	30.40	32.93	35.45	38.98	40.50	43.03	45.55	48.08	50.60	.253
27	27.98	30.52	33.05	35.58	38.12	40.65	43.19	45.72	48.25	50.79	.253
28	28.09	30.63	33.17	35.72	38.26	40.80	43.35	45.89	48.43	50.98	.254
29	28.19	30.74	33.30	35.85	38.40	40.95	43.51	46.06	48.61	51.17	.255
30	28.29	30.86	33.42	35.98	38.54	41.11	43.67	46.23	48.79	51.35	.256
31	28.40	30.97	33.54	36.11	38.69	41.26	43.83	46.40	48.97	51.54	.257
32	28.50	31.08	33.66	36.25	38.83	41.41	43.99	46.57	49.15	51.73	.258
33	28.61	31.20	33.79	36.38	38.97	41.56	44.15	46.74	49.33	51.92	.259
34	28.71	31.31	33.91	36.51	39.11	41.71	44.31	46.91	49.51	52.11	.260
35	28.81	31.42	34.03	36.64	39.25	41.86	44.47	47.08	49.69	52.30	.261
36	28.92	31.54	34.16	36.77	39.39	42.01	44.63	47.25	49.87	52.49	.262
37	29.02	31.65	34.28	36.91	39.54	42.16	44.79	47.42	50.05	52.68	.263
38	29.13	31.76	34.40	37.04	39.68	42.31	44.95	47.59	50.23	52.86	.264
39	29.23	31.88	34.52	37.17	39.82	42.46	45.11	47.76	50.41	53.05	.265
40	29.33	31.99	34.65	37.30	39.96	42.62	45.27	47.93	50.58	53.24	.266
41	29.44	32.10	34.77	37.43	40.10	42.77	45.43	48.10	50.76	53.43	.267
42	29.54	32.22	34.89	37.57	40.24	42.92	45.59	48.27	50.94	53.62	.268
43	29.65	32.33	35.01	37.70	40.38	43.07	45.75	48.44	51.12	53.81	.269
44	29.75	32.44	35.14	37.83	40.53	43.22	45.91	48.61	51.30	54.00	.269
45	29.85	32.56	35.26	37.96	40.67	43.37	46.07	48.78	51.48	54.18	.270
46	29.96	32.67	35.38	38.10	40.81	43.52	46.23	48.95	51.66	54.37	.271
47	30.06	32.78	35.51	38.23	40.95	43.67	46.39	49.12	51.84	54.56	.272
48	30.17	32.90	35.63	38.36	41.09	43.82	46.56	49.29	52.02	54.75	.273
49	30.27	33.01	35.75	38.49	41.23	43.97	46.72	49.46	52.20	54.94	.274
50	30.37	33.12	35.87	38.62	41.38	44.13	46.88	49.63	52.38	55.13	.275
51	30.48	33.24	36.00	38.76	41.52	44.28	47.04	49.80	52.56	55.32	.276
52	30.58	33.35	36.12	38.89	41.66	44.43	47.20	49.97	52.74	55.51	.277
53	30.69	33.46	36.24	39.02	41.80	44.58	47.36	50.14	52.91	55.69	.278
54	30.79	33.58	36.37	39.15	41.94	44.73	47.52	50.31	53.09	55.88	.279
55	30.89	33.69	36.49	39.29	42.08	44.88	47.68	50.48	53.27	56.07	.280
56	31.00	33.80	36.61	39.42	42.22	45.03	47.84	50.65	53.45	56.26	.281
57	31.10	33.92	36.73	39.55	42.37	45.18	48.00	50.82	53.63	56.45	.282
58	31.20	34.03	36.86	39.68	42.51	45.33	48.16	50.99	53.81	56.64	.283
59	31.31	34.14	36.98	39.81	42.65	45.48	48.32	51.16	53.99	56.83	.284
60	31.41	34.26	37.10	39.95	42.79	45.64	48.48	51.32	54.17	57.01	.284

Angle.	210	220	230	240	250	260	270	280	290	300	D
4° 0′	47.97	50.25	52.53	54.81	57.09	59.37	61.65	63.93	66.20	68.49	.228
1	48.17	50.46	52.75	55.04	57.33	59.62	61.91	64.20	66.48	68.78	.229
2	48.37	50.67	52.97	55.27	57.57	59.86	62.16	64.46	66.75	69.06	.230
3	48.57	50.88	53.19	55.49	57.80	60.11	62.42	64.73	67.02	69.34	.231
4	48.77	51.08	53.40	55.72	58.04	60.35	62.67	64.99	67.30	69.62	.232
5	48.97	51.29	53.62	55.95	58.27	60.60	62.93	65.25	67.57	69.91	.233
6	49.16	51.50	53.84	56.17	58.51	60.84	63.18	65.52	67.84	70.19	.234
7	49.36	51.71	54.05	56.40	58.74	61.09	63.44	65.78	68.12	70.47	.235
8	49.56	51.91	54.27	56.62	58.98	61.34	63.69	66.05	68.39	70.76	.236
9	49.76	52.12	54.49	56.85	59.22	61.58	63.94	66.31	68.67	71.04	.237
10	49.96	52.33	54.70	57.08	59.45	61.83	64.20	66.57	68.94	71.32	.237
11	50.15	52.54	54.92	57.30	59.69	62.07	64.45	66.84	69.21	71.60	.238
12	50.35	52.74	55.14	57.53	59.92	62.32	64.71	67.10	69.49	71.89	.239
13	50.55	52.95	55.35	57.76	60.16	62 56	64.96	67.37	69.76	72.17	.240
14	50.75	53.16	55.57	57.98	60.39	62.81	65.22	67.63	70 03	72.45	.241
15	50.95	53.37	55.79	58.21	60.63	63.05	65.47	67.89	70.31	72.74	.242
16	51.14	53.57	56.00	58.44	60.87	63.30	65.73	68.16	70.58	73.02	.243
17	51.34	53.78	56.22	58.66	61.10	63.54	65.98	68.42	70.85	73.30	.244
18	51.54	53.99	56.44	58.89	61.34	63.79	66.24	68.68	71.13	73.58	.245
19	51.74	54.20	56.66	59.11	61.57	64.03	66.49	68.95	71.40	73.87	.246
20	51.94	54.40	56.87	59.34	61.81	64.28	66.74	69.21	71.67	74.14	.247
21	52.13	54.61	57.09	59.57	62.04	64.52	67.00	69.48	71.95	74.43	.248
22	52.33	54.82	57.31	59.79	62.28	64.77	67.25	69.74	72.22	74.71	.249
23	52.53	55.03	57.52	60.02	62.52	65.01	67.51	70.00	72.49	75.00	.250
24	52.73	55.23	57.74	60.25	62.75	65 26	67.76	70.27	72.77	75.28	.251
25	52.93	55.44	57.96	60.47	62.99	65.50	68.02	70.53	73.04	75.56	.252
26	53.12	55.65	58.17	60.70	63.22	65.75	68.27	70.80	73.32	75.85	.253
27	53.32	55.86	58.39	60.92	63.46	65.99	68.53	71.06	73.59	76.13	.253
28	53.52	56.06	58.61	61.15	63.69	66.24	68.78	71.32	73.86	76.41	.254
29	53.72	56.27	58.82	61.38	63.93	66.48	69.04	71.59	74.14	76.69	.255
30	53.92	56.48	59.04	61.60	64.17	66.73	69.29	71.85	74.41	76.98	.256
31	54.11	56.69	59.26	61.83	64.40	66.97	69.54	72.12	74.68	77.26	.257
32	54.31	56.89	59.47	62.06	64.64	67.22	69.80	72.38	74.96	77.54	.258
33	54.51	57.10	59.69	62.28	64.87	67.46	70.05	72.64	75.23	77.83	.259
34	54.71	57.31	59.91	62.51	65.11	67.71	70.31	72.91	75.50	78.11	.260
35	54.91	57.52	60.13	62.73	65.34	67.95	70.56	73.17	75.78	78.39	.261
36	55.11	57 72	60.34	62.96	65.58	68.20	70.82	73.44	76.05	78.67	.262
37	55.30	57 93	60.56	63.19	65.82	68.44	71.07	73.70	76.32	78.96	.263
38	55.50	58 14	60.78	63.41	66.05	68.69	71.33	73.96	76.60	79.24	.264
39	55.70	58 35	60.99	63.64	66.29	68.93	71.58	74.23	76.87	79.52	.265
40	55.90	58 55	61.21	63.87	66.52	69.18	71.83	74.49	77.14	79.80	.266
41	56.10	58 76	61.43	64.09	66.76	69.42	72.09	74.76	77.42	80.09	.267
42	56.29	58 97	61.64	64.32	66.99	69.67	72.34	75.02	77.69	80.37	.268
43	56.49	59 18	61.86	64.55	67 23	69.91	72.60	75.28	77.97	80.65	.269
44	56.69	59 38	62.08	64.77	67.47	70.16	72.85	75.55	78.24	80.94	.269
45	56.89	59 59	62.29	65.00	67.70	70.40	73.11	75.81	78.51	81.22	.270
46	57.09	59 80	62.51	65.22	67.94	70.65	73.36	76.08	78.79	81.50	.271
47	57.28	60 01	62.73	65.45	68.17	70.89	73.62	76.34	79.06	81.78	.272
48	57.48	60 21	62.95	65.68	68.41	71.14	73.87	76.60	79.33	82.07	.273
49	57.68	60 42	63.16	65.90	68.64	71.38	74.13	76.87	79.61	82.35	.274
50	57.88	60 63	63.38	66.13	68.88	71.63	74.38	77.13	79.88	82.63	.275
51	58.08	60 84	63.60	66.36	69.12	71.87	74.63	77.40	80.15	82.92	.276
52	58.27	61 04	63.81	66.58	69.35	72.12	74.89	77.66	80.43	83.20	.277
53	58.47	61 25	64.03	66.81	69.59	72.37	75.14	77.92	80.70	83.48	.278
54	58.67	61 46	64.25	67.03	69.82	72.61	75.40	78.19	80.97	83.76	.279
55	58.87	61 67	64.46	67.26	70.06	72.86	75.65	78.45	81.25	84.05	.280
56	59.07	61 87	64.68	67.49	70.29	73.10	75.91	78.71	81.52	84.33	.281
57	59.25	62 08	64.90	67.71	70.53	73.35	76.16	78.98	81.79	84.61	.282
58	59.46	62 29	65.11	67.94	70.77	73.59	76.42	79.24	82.07	84.89	.283
59	59.66	62 50	65.33	68.17	71.00	73.84	76.67	79.51	82.34	85.18	.284
60	59.87	62 70	65.55	68.39	71.24	74.08	76.93	79.77	82.62	85.46	.284

Angle.	310	320	330	340	350	360	370	380	390	400	D
4° 0′	70.77	73.05	75.33	77.61	79.89	82.17	84.45	86.73	89.01	91.29	.228
1	71.07	73.36	75.64	77.93	80.22	82.51	84.80	87.09	89.38	91.67	.229
2	71.36	73.66	75.96	78.25	80.55	82.85	85.15	87.45	89.75	92 05	.230
3	71.65	73.96	76.27	78.57	80.88	83.19	85.50	87.81	90.12	92.42	.231
4	71.94	74.26	76.58	78.89	81.21	83.53	85.85	88.16	90.48	92.80	.232
5	72.23	74.56	76.89	79.22	81.54	83.87	86.20	88.52	90.85	93.18	.233
6	72.53	74.86	77.20	79.54	81.87	84.21	86.54	88.88	91.22	93.55	.234
7	72.83	75.16	77.51	79.86	82.20	84.55	86.89	89.24	91.59	93.93	.235
8	73.11	75.47	77.82	80.18	82.53	84.89	87.24	89.60	91.95	94.31	.236
9	73.40	75.77	78.13	80.50	82.86	85.23	87.59	89.95	92.32	94.68	.237
10	73.70	76.07	78.44	80.82	83.19	85.57	87.94	90.31	92.69	95.06	.237
11	73.99	76.37	78.75	81.14	83.52	85.90	88.29	90.67	93.05	95.44	.238
12	74.28	76.67	79.07	81.46	83.85	86.24	88.64	91.03	93.42	95.82	.239
13	74.57	76.97	79.38	81.78	84.18	86.58	88.99	91.39	93.79	96.19	.240
14	74.86	77.28	79.69	82.10	84.51	86.92	89.33	91.75	94.16	96.57	.241
15	75 16	77.58	80.00	82.42	84.84	87.26	89.68	92.10	94.52	96.95	.242
16	75.45	77.88	80.31	82.74	85.17	87.60	90 03	92.46	94.89	97.32	.243
17	75.74	78.18	80.62	83.00	85.50	87.94	90.38	92.82	95.26	97.70	.244
18	76.03	78.48	80.93	83.38	85.83	88.28	90.73	93.18	95.63	98.08	.245
19	76.33	78.78	81.24	83.70	86.16	88.62	91.08	93.54	95.99	98.45	.246
20	76.62	79.09	81.55	84.02	86.49	88.96	91.43	93.89	96.36	98.83	.247
21	76.91	79.39	81.86	84.34	86.82	89.30	91.77	94.25	96.73	99.21	.248
22	77.20	79.69	82.18	84.66	87.15	89.64	92.12	94.61	97.10	99.58	.249
23	77.49	79.99	82.49	84.98	87.48	89.98	92.47	94.97	97.46	99.96	.250
24	77.79	80.29	82.80	85.30	87.81	90 31	92.82	95.33	97.83	100 34	.251
25	78.08	80.59	83.11	85.62	88.14	90 65	93.17	95.68	98.20	100.71	.252
26	78.37	80.89	83.42	85.94	88.47	90.99	93.52	96.04	98.57	101.09	.253
27	78.66	81.20	83.73	86.26	88.80	91.33	93.87	96.40	98.93	101.47	.253
28	78.95	81.50	84.04	86.58	89.13	91 67	94.21	96.76	99.30	101.85	.254
29	79.25	81.80	84.35	86.90	89.46	92.01	94.56	97.12	99.67	102.22	.255
30	79.54	82.10	84.66	87.23	89.79	92 35	94.91	97.47	100.04	102.60	.256
31	79.83	82.40	84.97	87.55	90.12	92 69	95.26	97.83	100.40	102.98	.257
32	80.12	82.70	85.29	87.87	90.45	93.03	95.61	98.19	100.77	103.34	.258
33	80.42	83.01	85.60	88.19	90.78	93.37	95.96	98.55	101.14	103.72	.259
34	80.71	83.31	85.91	88.51	91.11	93.71	96.31	98.91	101.51	104.10	.260
35	81.00	83.61	86.22	88.83	91.44	94.05	96.66	99.26	101.87	104.47	.261
36	81.29	83.91	86.53	89.15	91.77	94.39	97.00	99.62	102.24	104.85	.262
37	81.58	84.21	86.84	89.47	92.10	94.72	97.35	99.98	102.61	105.23	.263
38	81.88	84.51	87.15	89.79	92.43	95.06	97.70	100.34	102.98	105.60	.264
39	82.17	84.82	87.46	90.11	92.76	95.40	98.05	100.70	103.34	105.98	.265
40	82.46	85.12	87.77	90.43	93.09	95.74	98.40	101.06	103.71	106.37	.266
41	82.75	85.42	88.08	90.75	93.42	96.08	98.75	101.41	104.08	106.74	.267
42	83.05	85.72	88.40	91.07	93.75	96.42	99.10	101.77	104.45	107.12	.268
43	83.34	86.02	88.71	91.39	94.08	96.76	99.44	102.13	104.81	107.50	.269
44	83.63	86.32	89.02	91.71	94.41	97.10	99.79	102.49	105.18	107.88	.269
45	83.92	86.63	89.33	92.03	94.73	97.44	100.14	102.85	105.55	108.25	.270
46	84.21	86.93	89.64	92.35	95.07	97.78	100.49	103.20	105.92	108.63	.271
47	84.51	87.23	89.95	92.67	95.39	98.12	100.84	103.56	106.28	109.01	.272
48	84.80	87.53	90.26	92.99	95.72	98.46	101.19	103.92	106.65	109.38	.273
49	85.09	87.83	90.57	93.31	96.05	98.79	101.54	104.28	107.02	109.76	.274
50	85.38	88.13	90.88	93.63	96.38	99.13	101.88	104.64	107.39	110.14	.275
51	85.67	88.43	91.19	93.95	96.71	99.47	102.23	104.99	107.75	110.51	.276
52	85.97	88.74	91.51	94.27	97.04	99.81	102.58	105.35	108.12	110.89	.277
53	86.26	89.04	91.82	94.59	97.37	100.15	102.93	105.71	108.49	111.27	.278
54	86.55	89.34	92.13	94.92	97.70	100.49	103.28	106.07	108.86	111.64	.279
55	86.84	89.64	92.44	95.24	98.03	100.83	103.63	106.43	109.22	112.02	.280
56	87.14	89.94	92.75	95.56	98.36	101.17	103.98	106.78	109.59	112.40	.281
57	87.43	90.24	93.06	95.88	98.69	101.51	104.33	107.14	109.96	112.78	.282
58	87.72	90.55	93.37	96.20	99.02	101.85	104.67	107.50	110.33	113.15	.283
59	88.01	90.85	93.68	96.52	99.35	102.19	105.02	107.86	110.69	113.53	.284
60	88.30	91.15	93.99	96.84	99.68	102.53	105.37	108.22	111.06	113.91	.284

Angle.	410	420	430	440	450	460	470	480	490	500	D
4° 0′	93.57	95.85	98.13	100.41	102.69	104.97	107.25	109.53	111.81	114.09	.228
1	93.96	96.25	98.54	100.83	103.12	105.40	107.69	109.98	112.27	114.56	.229
2	94.34	96.64	98.94	101.24	103.54	105.84	108.14	110.44	112.73	115.03	.230
3	94.73	97.04	99.35	101.66	103.96	106.27	108.58	110.89	113.20	115.50	.231
4	95.12	97.44	99.75	102.07	104.39	106.70	109.02	111.34	113.66	115.98	.232
5	95.50	97.83	100.16	102.48	104.81	107.14	109.47	111.79	114.12	116.45	.233
6	95.89	98.23	100.56	102.90	105.24	107.57	109.91	112.24	114.58	116.92	.234
7	96.28	98.62	100.97	103.31	105.66	108.00	110.35	112.70	115.04	117.39	.235
8	96.66	99.02	101.37	103.73	106.08	108.44	110.79	113.15	115.50	117.86	.236
9	97.05	99.41	101.78	104.14	106.51	108.87	111.24	113.60	115.97	118.33	.237
10	97.44	99.81	102.18	104.56	106.93	109.31	111.68	114.05	116.43	118.80	.237
11	97.82	100.21	102.59	104.97	107.36	109.74	112.12	114.51	116.89	119.27	.238
12	98.21	100.60	102.99	105.39	107.78	110.17	112.56	114.96	117.35	119.74	.239
13	98.59	101.00	103.40	105.80	108.20	110.61	113.01	115.41	117.81	120.21	.240
14	98.98	101.39	103.80	106.22	108.63	111.04	113.45	115.86	118.27	120.69	.241
15	99.37	101.80	104.21	106.63	109.05	111.47	113.89	116.31	118.74	121.16	.242
16	99.75	102.18	104.61	107.04	109.47	111.90	114.34	116.77	119.20	121.63	.243
17	100.14	102.58	105.02	107.46	109.90	112.34	114.78	117.22	119.66	122.10	.244
18	100.53	102.97	105.42	107.87	110.32	112.77	115.22	117.67	120.12	122.57	.245
19	100.91	103.37	105.83	108.29	110.75	113.20	115.66	118.12	120.58	123.04	.246
20	101.30	103.77	106.23	108.70	111.17	113.64	116.11	118.57	121.04	123.51	.247
21	101.68	104.16	106.64	109.11	111.59	114.07	116.55	119.03	121.50	123.98	.248
22	102.07	104.56	107.04	109.53	112.02	114.51	116.99	119.48	121.97	124.45	.249
23	102.46	104.95	107.45	109.95	112.44	114.94	117.43	119.93	122.43	124.92	.250
24	102.84	105.35	107.85	110.36	112.87	115.37	117.88	120.38	122.89	125.40	.251
25	103.23	105.74	108.26	110.78	113.29	115.81	118.32	120.84	123.35	125.87	.252
26	103.62	106.14	108.67	111.19	113.71	116.24	118.76	121.29	123.81	126.34	.253
27	104.00	106.54	109.07	111.60	114.14	116.67	119.21	121.74	124.27	126.81	.253
28	104.39	106.93	109.48	112.02	114.56	117.11	119.65	122.19	124.74	127.28	.254
29	104.78	107.33	109.88	112.43	114.99	117.54	120.09	122.64	125.20	127.75	.255
30	105.16	107.72	110.29	112.85	115.41	117.97	120.53	123.10	125.66	128.22	.256
31	105.55	108.12	110.69	113.26	115.83	118.41	120.98	123.55	126.12	128.69	.257
32	105.93	108.51	111.10	113.68	116.26	118.84	121.42	124.00	126.58	129.16	.258
33	106.32	108.91	111.50	114.09	116.68	119.27	121.86	124.45	127.04	129.63	.259
34	106.71	109.31	111.91	114.51	117.11	119.71	122.31	124.91	127.51	130.11	.260
35	107.09	109.70	112.31	114.92	117.53	120.14	122.75	125.36	127.97	130.57	.261
36	107.48	110.10	112.72	115.33	117.95	120.57	123.19	125.81	128.43	131.05	.262
37	107.87	110.49	113.12	115.75	118.38	121.01	123.63	126.26	128.89	131.52	.263
38	108.25	110.89	113.53	116.16	118.80	121.44	124.08	126.71	129.35	131.99	.264
39	108.64	111.28	113.93	116.58	119.23	121.87	124.52	127.17	129.81	132.46	.265
40	109.02	111.68	114.34	116.99	119.65	122.31	124.96	127.62	130.27	132.93	.266
41	109.41	112.08	114.74	117.41	120.07	122.74	125.40	128.07	130.74	133.40	.267
42	109.80	112.47	115.15	117.82	120.50	123.17	125.85	128.52	131.20	133.87	.268
43	110.18	112.87	115.55	118.24	120.92	123.61	126.29	128.97	131.66	134.34	.269
44	110.57	113.26	115.96	118.65	121.35	124.04	126.73	129.43	132.12	134.82	.269
45	110.96	113.66	116.36	119.07	121.77	124.47	127.18	129.88	132.58	135.29	.270
46	111.34	114.05	116.77	119.48	122.19	124.91	127.62	130.33	133.04	135.76	.271
47	111.73	114.45	117.17	119.89	122.62	125.34	128.06	130.78	133.51	136.23	.272
48	112.11	114.85	117.58	120.31	123.04	125.77	128.50	131.24	133.97	136.70	.273
49	112.50	115.24	117.98	120.72	123.46	126.21	128.95	131.69	134.43	137.17	.274
50	112.89	115.64	118.39	121.14	123.89	126.64	129.39	132.14	134.89	137.64	.275
51	113.27	116.03	118.79	121.55	124.31	127.07	129.83	132.59	135.35	138.11	.276
52	113.66	116.43	119.20	121.97	124.74	127.51	130.27	133.04	135.81	138.58	.277
53	114.05	116.82	119.60	122.38	125.16	127.94	130.72	133.50	136.28	139.05	.278
54	114.43	117.22	120.01	122.80	125.58	128.37	131.16	133.95	136.74	139.53	.279
55	114.82	117.62	120.41	123.21	126.01	128.81	131.60	134.40	137.20	140.00	.280
56	115.21	118.01	120.82	123.63	126.43	129.24	132.04	134.85	137.66	140.47	.281
57	115.59	118.41	121.22	124.04	126.86	129.67	132.49	135.31	138.12	140.94	.282
58	115.98	118.80	121.63	124.46	127.28	130.11	132.93	135.76	138.58	141.41	.283
59	116.36	119.20	122.03	124.87	127.70	130.54	133.37	136.21	139.04	141.88	.284
60	116.75	119.60	122.44	125.28	128.13	130.97	133.82	136.66	139.51	142.35	.284

Angle.	10	20	30	40	50	60	70	80	90	100	D
5° 0′	2.97	5.81	8.66	11.50	14.34	17.19	20.03	22.88	25.72	28.57	.284
1	2.98	5.83	8.68	11.54	14.39	17.25	20.10	22.95	25.81	28.66	.285
2	2.99	5.85	8.71	11.58	14.44	17.30	20.17	23.03	25.89	28.76	.286
3	3.00	5.87	8.74	11.61	14.49	17.36	20.23	23.10	25.98	28.85	.287
4	3.01	5.89	8.77	11.65	14.53	17.42	20.30	23.18	26.06	28.94	.288
5	3.02	5.91	8.80	11.69	14.58	17.47	20.36	23.26	26.15	29.04	.289
6	3.03	5.93	8.83	11.73	14.63	17.53	20.43	23.33	26.23	29.13	.290
7	3.03	5.94	8.85	11.77	14.68	17.59	20.50	23.41	26.32	29.23	.291
8	3.04	5.96	8.88	11.80	14.72	17.64	20.56	23.48	26.40	29.32	.292
9	3.05	5.98	8.91	11.84	14.77	17.70	20.63	23.56	26.48	29.41	.293
10	3.06	6.00	8.94	11.88	14.82	17.75	20.69	23.63	26.57	29.51	.294
11	3.07	6.02	8.97	11.92	14.86	17.81	20.76	23.71	26.65	29.60	.295
12	3.08	6.04	9.00	11.95	14.91	17.87	20.82	23.78	26.74	29.70	.296
13	3.09	6.06	9.03	11.99	14.96	17.92	20.89	23.86	26.82	29.79	.297
14	3.10	6.08	9.05	12.03	15.01	17.98	20.96	23.93	26.91	29.88	.298
15	3.11	6.10	9.08	12.07	15.05	18.04	21.02	24.01	26.99	29.98	.298
16	3.12	6.12	9.11	12.11	15.10	18.08	21.09	24.08	27.08	30.07	.299
17	3.13	6.14	9.14	12.14	15.15	18.15	21.15	24.16	27.16	30.16	.300
18	3.14	6.16	9.17	12.18	15.19	18.21	21.22	24.23	27.25	30.26	.301
19	3.15	6.17	9.20	12.22	15.24	18.26	21.29	24.31	27.33	30.35	.302
20	3.16	6.19	9.23	12.26	15.29	18.32	21.35	24.38	27.42	30.45	.303
21	3.17	6.21	9.25	12.29	15.34	18.38	21.42	24.46	27.50	30.54	.304
22	3.18	6.23	9.28	12.33	15.38	18.43	21.48	24.53	27.58	30.63	.305
23	3.19	6.25	9.31	12.37	15.43	18.49	21.55	24.61	27.67	30.73	.306
24	3.20	6.27	9.34	12.41	15.48	18.55	21.62	24.68	27.75	30.82	.307
25	3.21	6.29	9.37	12.45	15.52	18.60	21.68	24.76	27.84	30.92	.308
26	3.22	6.31	9.40	12.48	15.57	18.66	21.75	24.83	27.92	31.01	.309
27	3.23	6.33	9.42	12.52	15.62	18.72	21.81	24.91	28.01	31.10	.310
28	3.24	6.35	9.45	12.56	15.67	18.77	21.88	24.99	28.09	31.20	.311
29	3.25	6.37	9.48	12.60	15.71	18.83	21.95	25.06	28.18	31.29	.312
30	3.26	6.38	9.51	12.64	15.76	18.89	22.01	25.14	28.26	31.39	.313
31	3.27	6.40	9.54	12.67	15.81	18.94	22.08	25.21	28.35	31.48	.313
32	3.28	6.42	9.57	12.71	15.85	19.00	22.14	25.29	28.43	31.57	.314
33	3.29	6.44	9.60	12.75	15.90	19.06	22.21	25.36	28.52	31.67	.315
34	3.30	6.46	9.62	12.79	15.95	19.11	22.27	25.44	28.60	31.76	.316
35	3.31	6.48	9.65	12.82	16.00	19.17	22.34	25.51	28.68	31.86	.317
36	3.32	6.50	9.68	12.86	16.04	19.22	22.41	25.59	28.77	31.95	.318
37	3.33	6.52	9.71	12.90	16.09	19.28	22.47	25.66	28.85	32.04	.319
38	3.34	6.54	9.74	12.94	16.14	19.34	22.54	25.74	28.94	32.14	.320
39	3.35	6.56	9.77	12.98	16.18	19.39	22.60	25.81	29.02	32.23	.321
40	3.36	6.58	9.79	13.01	16.23	19.45	22.67	25.89	29.11	32.33	.322
41	3.37	6.60	9.82	13.05	16.28	19.51	22.74	25.96	29.19	32.42	.323
42	3.38	6.61	9.85	13.09	16.33	19.56	22.80	26.04	29.28	32.51	.324
43	3.39	6.63	9.88	13.13	16.37	19.62	22.87	26.11	29.36	32.61	.325
44	3.40	6.65	9.91	13.16	16.42	19.68	22.93	26.19	29.45	32.70	.326
45	3.41	6.67	9.94	13.20	16.47	19.73	23.00	26.26	29.53	32.80	.327
46	3.42	6.69	9.96	13.24	16.51	19.79	23.07	26.34	29.61	32.89	.327
47	3.43	6.71	9.99	13.28	16.56	19.85	23.13	26.41	29.70	32.98	.328
48	3.43	6.73	10.02	13.32	16.61	19.90	23.20	26.49	29.78	33.08	.329
49	3.44	6.75	10.05	13.35	16.66	19.96	23.26	26.57	29.87	33.17	.330
50	3.45	6.77	10.08	13.39	16.70	20.02	23.33	26.64	29.95	33.27	.331
51	3.46	6.79	10.11	13.43	16.75	20.07	23.40	26.72	30.04	33.36	.332
52	3.47	6.81	10.14	13.47	16.80	20.13	23.46	26.79	30.12	33.45	.333
53	3.48	6.82	10.16	13.51	16.85	20.19	23.53	26.87	30.21	33.55	.334
54	3.49	6.84	10.19	13.54	16.89	20.24	23.59	26.94	30.29	33.64	.335
55	3.50	6.86	10.22	13.58	16.94	20.30	23.66	27.02	30.38	33.74	.336
56	3.51	6.88	10.25	13.62	16.99	20.36	23.72	27.09	30.46	33.83	.337
57	3.52	6.90	10.28	13.66	17.03	20.41	23.79	27.17	30.55	33.92	.338
58	3.53	6.92	10.31	13.69	17.08	20.47	23.86	27.24	30.63	34.02	.339
59	3.54	6.94	10.33	13.73	17.13	20.53	23.92	27.32	30.71	34.11	.340
60	3.55	6.96	10.36	13.77	17.18	20.58	23.99	27.39	30.80	34.21	.341

Angle.	110	120	130	140	150	160	170	180	190	200	D
5° 0′	31.41	34.26	37.10	39.95	42.79	45.64	48.48	51.32	54.17	57.01	.284
1	31.52	34.37	37.22	40.08	42.93	45.79	48.64	51.49	54.35	57.20	.285
2	31.62	34.48	37.35	40.21	43.07	45.94	48.80	51.66	54.53	57.39	.286
3	31.72	34.59	37.47	40.34	43.21	46.09	48.96	51.83	54.70	57.58	.287
4	31.83	34.71	37.59	40.47	43.35	46.24	49.12	52.00	54.88	57.76	.288
5	31.93	34.82	37.71	40.60	43.49	46.39	49.28	52.17	55.06	57.95	.289
6	32.03	34.93	37.83	40.73	43.64	46.54	49.44	52.34	55.24	58.14	.290
7	32.14	35.05	37.96	40.87	43.78	46.69	49.60	52.51	55.42	58.33	.291
8	32.24	35.16	38.09	41.00	43.92	46.84	49.76	52.68	55.59	58.51	.292
9	32.34	35.27	38.20	41.12	44.06	46.99	49.91	52.84	55.77	58.70	.293
10	32.45	35.38	38.32	41.26	44.20	47.14	50.07	53.01	55.95	58.89	.294
11	32.55	35.50	38.44	41.39	44.34	47.29	50.23	53.18	56.13	59.08	.295
12	32.65	35.61	38.57	41.52	44.48	47.44	50.39	53.35	56.31	59.26	.296
13	32.76	35.72	38.69	41.65	44.62	47.59	50.55	53.52	56.49	59.46	.297
14	32.86	35.83	38.81	41.79	44.76	47.74	50.71	53.69	56.66	59.64	.298
15	32.96	35.95	38.93	41.92	44.90	47.89	50.87	53.86	56.84	59.83	.298
16	33.07	36.06	39.05	42.05	45.04	48.04	51.03	54.03	57.02	60.01	.299
17	33.17	36.17	39.18	42.18	45.18	48.19	51.19	54.19	57.20	60.20	.300
18	33.27	36.28	39.30	42.31	45.32	48.34	51.35	54.36	57.38	60.39	.301
19	33.38	36.40	39.42	42.44	45.46	48.49	51.51	54.53	57.55	60.58	.302
20	33.48	36.51	39.54	42.57	45.61	48.64	51.67	54.70	57.73	60.76	.303
21	33.58	36.62	39.66	42.71	45.75	48.79	51.83	54.87	57.91	60.95	.304
22	33.69	36.74	39.79	42.84	45.89	48.94	51.99	55.04	58.09	61.14	.305
23	33.79	36.85	39.91	42.97	46.03	49.09	52.15	55.21	58.27	61.33	.306
24	33.89	36.96	40.03	43.10	46.17	49.24	52.31	55.38	58.44	61.51	.307
25	34.00	37.07	40.15	43.23	46.31	49.39	52.47	55.54	58.62	61.70	.308
26	34.10	37.19	40.27	43.36	46.45	49.54	52.63	55.71	58.80	61.89	.309
27	34.20	37.30	40.40	43.49	46.59	49.69	52.78	55.88	58.98	62.08	.310
28	34.31	37.41	40.52	43.62	46.73	49.84	52.94	56.05	59.16	62.26	.311
29	34.41	37.52	40.64	43.76	46.87	49.99	53.10	56.22	59.34	62.45	.312
30	34.51	37.64	40.76	43.89	47.01	50.14	53.26	56.39	59.51	62.64	.313
31	34.62	37.75	40.88	44.02	47.15	50.29	53.42	56.56	59.69	62.83	.313
32	34.72	37.86	41.01	44.15	47.29	50.44	53.58	56.73	59.87	63.01	.314
33	34.82	37.98	41.13	44.28	47.44	50.59	53.74	56.90	60.05	63.20	.315
34	34.93	38.09	41.25	44.41	47.58	50.74	53.90	57.06	60.23	63.39	.316
35	35.03	38.20	41.37	44.54	47.72	50.89	54.06	57.23	60.40	63.58	.317
36	35.13	38.31	41.49	44.68	47.86	51.04	54.22	57.40	60.58	63.76	.318
37	35.23	38.43	41.62	44.81	48.00	51.19	54.38	57.57	60.76	63.95	.319
38	35.34	38.54	41.74	44.94	48.14	51.34	54.54	57.74	60.94	64.14	.320
39	35.44	38.65	41.86	45.07	48.28	51.49	54.70	57.91	61.12	64.33	.321
40	35.54	38.76	41.98	45.20	48.42	51.64	54.86	58.08	61.30	64.51	.322
41	35.65	38.88	42.10	45.33	48.56	51.79	55.02	58.25	61.47	64.70	.323
42	35.75	38.99	42.23	45.46	48.70	51.94	55.18	58.41	61.65	64.89	.324
43	35.85	39.10	42.35	45.60	48.84	52.09	55.34	58.58	61.83	65.08	.325
44	35.96	39.21	42.47	45.73	48.98	52.24	55.50	58.75	62.01	65.26	.326
45	36.06	39.33	42.59	45.86	49.12	52.39	55.65	58.92	62.19	65.45	.327
46	36.16	39.44	42.71	45.99	49.26	52.54	55.81	59.09	62.36	65.64	.327
47	36.27	39.55	42.84	46.12	49.41	52.69	55.97	59.26	62.54	65.83	.328
48	36.37	39.66	42.96	46.25	49.55	52.84	56.13	59.43	62.72	66.01	.329
49	36.47	39.78	43.08	46.38	49.69	52.99	56.29	59.60	62.90	66.20	.330
50	36.58	39.89	43.20	46.52	49.83	53.14	56.45	59.76	63.08	66.39	.331
51	36.68	40.00	43.32	46.65	49.97	53.29	56.61	59.93	63.26	66.58	.332
52	36.78	40.12	43.45	46.78	50.11	53.44	56.77	60.10	63.43	66.76	.333
53	36.89	40.23	43.57	46.91	50.25	53.59	56.93	60.27	63.61	66.95	.334
54	36.99	40.34	43.69	47.04	50.39	53.74	57.09	60.44	63.79	67.14	.335
55	37.09	40.45	43.81	47.17	50.53	53.89	57.25	60.61	63.97	67.33	.336
56	37.20	40.57	43.93	47.30	50.67	54.04	57.41	60.78	64.15	67.51	.337
57	37.30	40.68	44.06	47.43	50.81	54.19	57.57	60.95	64.32	67.70	.338
58	37.40	40.79	44.18	47.57	50.95	54.34	57.73	61.12	64.50	67.89	.339
59	37.51	40.90	44.30	47.70	51.09	54.49	57.89	61.28	64.68	68.08	.340
60	37.61	41.02	44.42	47.83	51.23	54.64	58.05	61.45	64.86	68.26	.341

Angle.	210	220	230	240	250	260	270	280	290	300	D
5° 0′	59.86	62.70	65.55	68.39	71.24	74.08	76.93	79.77	82.62	85.46	.284
1	60.06	62.91	65.76	68.62	71.47	74.33	77.18	80.03	82.89	85.74	.285
2	60.25	63.12	65.98	68.84	71.71	74.57	77.43	80.30	83.16	86.02	.286
3	60.45	63.32	66.19	69.07	71.94	74.81	77.69	80.56	83.43	86.30	.287
4	60.65	63.53	66.41	69.29	72.17	75.06	77.94	80.82	83.70	86.58	.288
5	60.84	63.73	66.63	69.52	72.41	75.30	78.19	81.08	83.97	86.87	.289
6	61.04	63.94	66.84	69.74	72.64	75.54	78.44	81.34	84.25	87.15	.290
7	61.24	64.15	67.06	69.97	72.88	75.79	78.70	81.61	84.52	87.43	.291
8	61.43	64.35	67.27	70.19	73.11	76.03	78.95	81.87	84.79	87.71	.292
9	61.63	64.56	67.49	70.42	73.34	76.27	79.20	82.13	85.06	87.99	.293
10	61.83	64.77	67.70	70.64	73.58	76.52	79.46	82.39	85.33	88.27	.294
11	62.02	64.97	67.92	70.87	73.81	76.76	79.71	82.66	85.60	88.55	.295
12	62.22	65.18	68.13	71.09	74.05	77.01	79.96	82.92	85.88	88.85	.296
13	62.42	65.38	68.35	71.32	74.28	77.25	80.22	83.18	86.15	89.11	.297
14	62.61	65.59	68.57	71.54	74.52	77.49	80.47	83.44	86.42	89.39	.298
15	62.81	65.80	68.78	71.77	74.75	77.74	80 72	83.71	86.69	89.68	.298
16	63.01	66.00	69.00	71.99	74.99	77.98	80.97	83.97	86.96	89.96	.299
17	63.20	66.21	69.21	72.22	75.22	78.22	81.23	84.23	87.23	90.24	.300
18	63.40	66.41	69.43	72.44	75.45	78.47	81.48	84.49	87.51	90.52	.301
19	63.60	66.62	69.64	72.67	75.69	78.71	81.73	84.76	87.78	90.80	.302
20	63.80	66.83	69.86	72.89	75.92	78.95	81.99	85.02	88.05	91.08	.303
21	63.99	67.03	70.07	73.12	76.16	79.20	82.24	85.28	88.32	91.36	.304
22	64.19	67.24	70.29	73.34	76.39	79.44	82.49	85.54	88.59	91.64	.305
23	64.39	67.45	70.51	73.57	76.63	79.69	82.75	85.80	88.86	91.92	.306
24	64.58	67.65	70.72	73.79	76.86	79.93	83.00	86.07	89.14	92.21	.307
25	64.78	67.86	70.94	74.02	77.09	80.17	83.25	86.33	89.41	92.49	.508
26	64.98	68.06	71.15	74.24	77.33	80.42	83.50	86.59	89.68	92.77	.309
27	65.17	68.27	71.37	74.47	77.56	80.66	83.76	86.85	89.95	93.05	.310
28	65.37	68.48	71.58	74.69	77.80	80.90	84.01	87.12	90.22	93.33	.311
29	65.57	68.68	71.80	74.91	78.03	81.15	84.26	87.38	90.49	93.61	.312
30	65.76	68.89	72.01	75.14	78.27	81.39	84.52	87.64	90.77	93.89	.313
31	65.96	69.10	72.23	75.36	78.50	81.63	84.77	87.90	91.04	94.17	.313
32	66.16	69.30	72.45	75.59	78.73	81.88	85.02	88.17	91.31	94.45	.314
33	66.35	69.51	72.66	75.81	78.97	82.12	85.28	88.43	91.58	94.73	.315
34	66.55	69.71	72.88	76.04	79.20	82.36	85.53	88.69	91.85	95.02	.316
35	66.75	69.92	73.09	76.26	79.44	82.61	85.78	88.95	92.12	95.30	.317
36	66.95	70.13	73.31	76.49	79.67	82.85	86.03	89.22	92.40	95.58	.318
37	67.14	70.33	73.52	76.71	79.90	83.10	86.29	89.48	92.67	95.86	.319
38	67.34	70.54	73.74	76.94	80.14	83.34	86.54	89.74	92.94	96.14	.320
39	67.54	70.75	73.95	77.16	80.37	83.58	86.79	90.00	93.21	96.41	.321
40	67.73	70.95	74.17	77.39	80.61	83.83	87.05	90.26	93.48	96.70	.322
41	67.93	71.16	74.39	77.61	80.84	84.07	87.30	90.53	93.76	96.98	.323
42	68.13	71.36	74.60	77.84	81.08	84.31	87.55	90.79	94.03	97.26	.324
43	68.32	71.57	74.82	78.06	81.31	84.56	87.81	91.05	94.30	97.55	.325
44	68.52	71.78	75.03	78.29	81.55	84.88	88.06	91.31	94.57	97.83	.326
45	68.72	71.98	75.25	78.51	81.78	85.04	88.31	91.58	94.84	98.11	.327
46	68.91	72.19	75.46	78.74	82.01	85.29	88.56	91.84	95.11	98.39	.327
47	69.11	72.39	75.68	78.96	82.25	85.53	88.82	92.10	95.39	98.67	.328
48	69.31	72.60	75.89	79.19	82.48	85.78	89.07	92.36	95.66	98.95	.329
49	69.50	72.81	76.11	79.41	82.72	86.02	89.32	92.63	95.93	99.23	.330
50	63.70	73.01	76.33	79.64	82.95	86.26	89.58	92.89	96.20	99.51	.331
51	69.90	73.22	76.54	79.86	83.19	86.51	89.83	93.15	96.47	99.79	.332
52	70.10	73.43	76.76	80.09	83.42	86.75	90.08	93.41	96.74	100.08	.333
53	70.29	73.63	76.97	80.31	83.65	86.99	90.34	93.68	97.02	100.36	.334
54	70 49	73.84	77.19	80.54	83.89	87.24	90.59	93.94	97.29	100.64	.334
55	70.69	74.04	77.40	80.76	84.12	87.48	90.84	94.20	97.56	100.92	.336
56	70.88	74.35	77.62	80.99	84.36	87.72	91.09	94.46	97.83	101.20	.337
57	71.08	74.56	77.83	81.21	84.59	87.97	91.35	94.72	98.10	101.48	.338
58	71.28	74.76	78.05	81.44	84.82	88.21	91.60	94.99	98.37	101.76	.339
59	71.47	74.97	78.27	81.66	85.06	88.46	91.85	95.25	98.65	102.04	.340
60	71.67	75.08	78.48	81.89	85.29	88.70	92.11	95.51	98.92	102.32	.341

Angle.	310	320	330	340	350	360	370	380	390	400	D
5° 0′	88.30	91.15	93.99	96.84	99.68	102.53	105.37	108.22	111.06	113.91	.284
1	88.60	91.45	94.30	97.16	100.01	102.86	105.72	108.57	111.43	114.28	.285
2	88.89	91.75	94.61	97.48	100.34	103.20	106.07	108.93	111.79	114.66	.286
3	89.18	92.05	94.92	97.79	100.6	103.54	106.41	109.28	112.16	115.03	.287
4	89.47	92.35	95.23	98.11	100.99	103.88	106.76	109.64	112.52	115.40	.288
5	89.76	92.65	95.54	98.43	101.32	104.21	107.10	110.00	112.89	115.78	.289
6	90.05	92.95	95.85	98.75	101.65	104.55	107.45	110.35	113.25	116.15	.290
7	90.34	93.25	96.16	99.07	101.98	104.89	107.80	110.71	113.62	116.53	.291
8	90.63	93.55	96.47	99.39	102.31	105.23	108.14	111.06	113.98	116.90	.292
9	90.92	93.85	96.78	99.70	102.63	105.56	108.49	111.42	114.35	117.28	.293
10	91.21	94.15	97.09	100.02	102.96	105.90	108.84	111.78	114.71	117.65	.294
11	91.50	94.45	97.39	100.31	103.29	106.24	109.18	112.13	115.08	118.03	.295
12	91.79	94.75	97.70	100.66	103.62	106.57	109.53	112.49	115.44	118.40	.296
13	92.08	95.05	98.01	100.98	103.94	106.91	109.88	112.84	115.81	118.78	.297
14	92.37	95.35	98.32	101.30	104.27	107.25	110.22	113.20	116.17	119.15	.298
15	92.66	95.65	98.63	101.62	104.60	107.59	110.57	113.56	116.54	119.53	.298
16	92.95	95.95	98.94	101.93	104.93	107.92	110.92	113.91	116.91	119.90	.299
17	93.24	96.24	99.25	102.25	105.26	108.26	111.26	114.27	117.27	120.27	.300
18	93.53	96.54	99.56	102.57	105.5-	108.60	111.61	114.62	117.64	120.65	.301
19	93.82	96.84	99.87	102.89	105.91	108.93	111.96	114.98	118.00	121.02	.302
20	94.11	97.14	100.18	103.21	106.24	109.27	112.30	115.33	118.37	121.40	.303
21	94.40	97.44	100.48	103.53	106.57	109.61	112.65	115.69	118.73	121.77	.304
22	94.69	97.74	100.79	103.84	106.89	109.95	113.00	116.05	119.10	122.15	.305
23	94.98	98.04	101.10	104.16	107.22	110.28	113.34	116.40	119.46	122.52	.306
24	95.27	98.34	101.41	104.48	107.55	110.62	113.69	116.76	119.83	122.90	.307
25	95.56	98.64	101.72	104.80	107.88	110.96	114.04	117.11	120.19	123.27	.308
26	95.86	98.94	102.03	105.12	108.21	111.29	114.38	117.47	120.56	123.65	.309
27	96.15	99.24	102.34	105.44	108.53	111.63	114.73	117.83	120.92	124.02	.310
28	96.44	99.54	102.65	105.76	108.86	111.97	115.08	118.18	121.29	124.39	.311
29	96.73	99.84	102.96	106.07	109.19	112.31	115.42	118.54	121.65	124.77	.312
30	97.02	100.14	103.27	106.39	109.52	112.64	115.77	118.89	122.02	125.14	.313
31	97.31	100.44	103.58	106.71	109.85	112.98	116.11	119.25	122.38	125.52	.313
32	97.60	100.74	103.89	107.03	110.17	113.32	116.46	119.61	122.75	125.89	.314
33	97.89	101.04	104.19	107.35	110.50	113.66	116.81	119.96	123.11	126.27	.315
34	98.18	101.34	104.50	107.67	110.83	113.99	117.15	120.32	123.48	126.64	.316
35	98.47	101.64	104.81	107.98	111.16	114.33	117.50	120.67	123.84	127.02	.317
36	98.76	101.94	105.12	108.30	111.48	114.67	117.85	121.03	124.21	127.39	.318
37	99.05	102.24	105.43	108.62	111.81	115.00	118.19	121.39	124.58	127.77	.319
38	99.34	102.54	105.74	108.94	112.14	115.34	118.54	121.74	124.94	128.14	.320
39	99.63	102.84	106.05	109.26	112.47	115.68	118.89	122.10	125.31	128.52	.321
40	99.92	103.14	106.36	109.58	112.80	116.02	119.23	122.45	125.67	128.89	.322
41	100.21	103.44	106.67	109.90	113.12	116.35	119.58	122.81	126.04	129.26	.323
42	100.50	103.74	106.98	110.21	113.45	116.69	119.93	123.16	126.40	129.64	.324
43	100.79	104.04	107.29	110.53	113.78	117.03	120.27	123.52	126.77	130.01	.325
44	101.08	104.34	107.60	110.85	114.11	117.36	120.62	123.88	127.13	130.39	.326
45	101.37	104.64	107.90	111.17	114.44	117.70	120.97	124.23	127.50	130.76	.327
46	101.66	104.94	108.21	111.49	114.76	118.04	121.31	124.59	127.86	131.14	.327
47	101.95	105.24	108.52	111.81	115.09	118.38	121.66	124.94	128.23	131.51	.328
48	102.24	105.54	108.83	112.12	115.42	118.71	122.01	125.30	128.59	131.89	.329
49	102.53	105.84	109.14	112.44	115.75	119.05	122.35	125.66	128.96	132.26	.330
50	102.82	106.14	109.45	112.76	116.07	119.39	122.70	126.01	129.32	132.64	.331
51	103.12	106.44	109.76	113.08	116.40	119.72	123.05	126.37	129.69	133.01	.332
52	103.41	106.74	110.07	113.40	116.73	120.06	123.39	126.72	130.05	133.39	.333
53	103.70	107.04	110.38	113.72	117.05	120.40	123.74	127.08	130.42	133.76	.334
54	103.99	107.34	110.69	114.04	117.39	120.74	124.09	127.44	130.78	134.13	.335
55	104.28	107.64	111.00	114.35	117.71	121.07	124.43	127.79	131.15	134.51	.336
56	104.57	107.94	111.30	114.67	118.04	121.41	124.78	128.15	131.52	134.88	.337
57	104.86	108.24	111.61	114.99	118.37	121.75	125.12	128.50	131.88	135.26	.338
58	105.15	108.54	111.92	115.31	118.70	122.09	125.47	128.86	132.25	135.63	.339
59	105.44	108.84	112.23	115.63	119.02	122.42	125.82	129.21	132.61	136.01	.340
60	105.73	109.14	112.54	115.95	119.35	122.76	126.16	129.57	132.98	136.38	.341

Angle.	410	420	430	440	450	460	470	480	490	500	D
5° 0′	116.75	119.60	122.44	125.28	128.1[illegible]	130.97	133.82	136.66	139.51	142.35	.284
1	117.13	119.99	122.84	125.70	128.55	131.40	134.26	137.11	139.97	142.82	.285
2	117.52	120.38	123.25	126.11	128.97	131.84	134.70	137.56	140.4[illegible]	143.29	.286
3	117.90	120.77	123.65	126.52	129.39	1[illegible]2.27	135.14	138.01	140.88	143.76	.287
4	118.29	121.17	124.05	126.93	129.81	132.70	135.58	138.46	141.34	144.22	.288
5	118.67	121.56	124.45	127.34	130.24	133.13	136.02	138.91	141.80	144.69	.289
6	119.05	121.96	124.86	127.76	130.66	133.56	136.46	139.36	142.26	145.16	.290
7	119.44	122.35	125.26	128.17	131.08	133.99	136.90	139.81	142.72	145.63	.291
8	119.82	122.74	125.66	128.58	131.50	134.42	137.34	140.26	143.18	146.10	.292
9	120.21	123.13	126.06	128.99	131.92	134.85	137.78	140.71	143.64	146.56	.293
10	120.59	123.53	126.47	129.40	132.34	135.28	138.22	141.16	144.10	147.03	.294
11	120.97	123.92	126.87	129.82	132.76	135.71	138.66	141.61	144.55	147.50	.295
12	121.36	124.31	127.27	130.23	133.19	136.14	139.10	142.06	145.01	147.97	.296
13	121.74	124.71	127.67	130.64	133.61	136.57	139.54	142.51	145.47	148.44	.297
14	122.13	125.10	128.08	131.05	134.0[illegible]	137.00	139.98	142.95	145.9[illegible]	148.91	.298
15	122.51	125.49	128.48	131.46	134.45	137.44	140.42	143.40	146.39	149.37	.298
16	122.89	125.89	128.88	131.88	134.87	137.87	140.86	143.85	146.85	149.84	.299
17	123.28	126.28	129.29	132.29	135.29	138.30	141.30	144.30	147.31	150.31	.300
18	123.66	126.67	129.69	132.70	135.71	138.73	141.74	144.75	147.77	150.78	.301
19	124.05	127.07	130.09	133.11	136.14	139.16	142.18	145.20	148.22	151.25	.302
20	124.43	127.46	130.49	133.53	136.56	139.59	142.62	145.65	148.68	151.72	.303
21	124.81	127.85	130.90	133.94	136.98	140.02	143.06	146.10	149.14	152.18	.304
22	125.20	128.25	131.30	134.35	137.40	140.45	143.50	146.55	149.60	152.65	.305
23	125.58	128.64	131.70	134.76	137.82	140.88	143.94	147.00	150.06	153.12	.306
24	125.97	129.03	132.10	135.17	138.24	141.31	144.38	147.45	150.52	153.59	.307
25	126.35	129.43	132.51	135.59	138.66	141.74	144.82	147.90	150.98	154.06	.308
26	126.73	129.82	132.91	136.00	139.09	142.17	145.26	148.35	151.44	154.52	.309
27	127.12	130.21	133.31	136.41	139.51	142.60	145.70	148.80	151.90	154.99	.310
28	127.50	130.61	133.71	136.82	139.92	143.03	146.14	149.25	152.35	155.46	.311
29	127.88	131.00	134.12	137.23	140.35	143.46	146.58	149.70	152.81	155.93	.312
30	128.27	131.39	134.52	137.65	140.77	143.90	147.02	150.15	153.27	156.40	.313
31	128.65	131.79	134.92	138.06	141.19	144.33	147.46	150.60	153.73	156.86	.313
32	129.04	132.18	135.33	138.47	141.61	144.76	147.90	151.05	154.19	157.33	.314
33	129.42	132.57	135.73	138.88	142.03	145.19	148.34	151.49	154.65	157.80	.315
34	129.81	132.97	136.13	139.29	142.46	145.62	148.78	151.94	155,11	158.27	.316
35	130.19	133.36	136.53	139.71	142.88	146.04	149.22	152.39	155.57	158.74	.317
36	130.57	133.75	136.94	140.12	143.30	146.48	149.66	152.84	156.02	159.21	.318
37	130.96	134.15	137.34	140.53	143.72	146.91	150.10	153.29	156.48	159.67	.319
38	131.34	134.54	137.74	140.94	144.14	147.34	150.54	153.74	156.94	160.14	.320
39	131.72	134.93	138.14	141.35	144.56	147.77	150.98	154.19	157.40	160.61	.321
40	132.11	135.33	138.55	141.77	144.98	148.20	151.42	154.64	157.86	161.08	.322
41	132.49	135.72	138.95	142.18	145.41	148.63	151.86	155.09	158.32	161.55	.323
42	132.88	136.11	139.35	142.59	145.82	149.06	152.30	155.54	158.78	162.01	.324
43	133.26	136.51	139.75	143.00	146.25	149.50	152.74	155.99	159.24	162.48	.325
44	133.64	136.90	140.16	143.41	146.67	149.92	153.18	156.44	159.69	162.95	.326
45	134.03	137.29	140.56	143.83	147.09	150.36	153.62	156.89	160.15	163.42	.327
46	134.41	137.69	140.96	144.24	147.51	150.79	154.06	157.34	160.61	163.89	.327
47	134.80	138.08	141.37	144.65	147.97	151.22	154.50	157.79	161.07	164.36	.328
48	135.18	138.47	141.77	145.06	148.36	151.65	154.94	158.24	161.54	164.82	.329
49	135.56	138.87	142.17	145.47	148.78	152.08	155.38	158.69	161.99	165.29	.330
50	135.95	139.26	142.57	145.89	149.20	152.51	155.82	159.14	162.45	165.76	.331
51	136.33	139.65	142.98	146.30	149.62	152.94	156.26	159.58	162.91	166.23	.332
52	136.72	140.05	143.38	146.71	150.04	153.37	156.70	160.03	163.37	166.70	.333
53	137.10	140.44	143.78	147.12	150.46	153.80	157.14	160.48	163.82	167.16	.334
54	137.48	140.8[illegible]	144.18	147.53	150.88	154.23	157.58	160.93	164.28	167.63	.335
55	137.87	141.23	144.59	147.95	151.31	154.66	158.02	161.38	164.74	168.10	.336
56	138.25	141.62	144.99	148.36	151.73	155.09	158.46	161.83	165.20	168.57	.337
57	138.64	142.01	145.39	148.77	152.15	155.5[illegible]	158.90	162.28	165.66	169.04	.338
58	139.02	142.41	145.79	149.18	152.57	155.96	159.34	162.73	166.12	169.50	.339
59	139.40	142.80	146.20	149.59	152.99	156.[illegible]9	159.78	163.18	166.58	169.97	.340
60	139.79	143.19	146.60	150.01	153.41	156.82	160.22	163.63	167.04	170.44	.341

Angle.	10	20	30	40	50	60	70	80	90	100	D
6° 0′	3.55	6.96	10.36	13.77	17.18	20.58	23.99	27.39	30.80	34.21	.341
1	3.56	6.98	10.39	13.81	17.22	20.64	24.05	27.47	30.88	34.30	.342
2	3.57	7.00	10.42	13.85	17.27	20.69	24.12	27.54	30.97	34.39	.342
3	3.58	7.02	10.45	13.88	17.32	20.75	24.18	27.62	31.05	34.49	.343
4	3.59	7.03	10.48	13.92	17.36	20.81	24.25	27.69	31.14	34.58	.344
5	3.60	7.05	10.51	13.96	17.41	20.86	24.31	27.77	31.22	34.67	.345
6	3.61	7.07	10.53	14.00	17.46	20.92	24.38	27.84	31.30	34.76	.346
7	3.62	7.09	10.56	14.03	17.50	20.97	24.45	27.92	31.39	34.86	.347
8	3.63	7.11	10.59	14.07	17.55	21.03	24.51	27.99	31.47	34.95	.348
9	3.64	7.13	10.62	14.11	17.60	21.09	24.57	28.07	31.56	35.04	.349
10	3.65	7.15	10.65	14.15	17.64	21.14	24.64	28.14	31.64	35.14	.350
11	3.66	7.17	10.67	14.18	17.69	21.20	24.71	28.22	31.72	35.23	.351
12	3.67	7.19	10.70	14.22	17.74	21.26	24.77	28.29	31.81	35.32	.352
13	3.68	7.20	10.73	14.26	17.78	21.31	24.84	28.36	31.89	35.42	.353
14	3.69	7.22	10.76	14.30	17.83	21.37	24.90	28.44	31.98	35.51	.354
15	3.70	7.24	10.79	14.33	17.88	21.42	24.97	28.51	32.06	35.60	.355
16	3.71	7.26	10.82	14.37	17.93	21.48	25.03	28.59	32.14	35.70	.355
17	3.72	7.28	10.84	14.41	17.97	21.54	25.10	28.66	32.23	35.79	.356
18	3.73	7.30	10.87	14.45	18.02	21.59	25.16	28.74	32.31	35.88	.357
19	3.74	7.32	10.90	14.48	18.07	21.65	25.23	28.81	32.40	35.98	.358
20	3.75	7.34	10.93	14.52	18.11	21.70	25.30	28.89	32.48	36.07	.359
21	3.76	7.36	10.96	14.56	18.16	21.76	25.36	28.96	32.56	36.16	.360
22	3.77	7.38	10.99	14.60	18.21	21.82	25.43	29.04	32.65	36.26	.361
23	3.78	7.39	11.01	14.63	18.25	21.87	25.49	29.11	32.73	36.35	.362
24	3.78	7.41	11.04	14.67	18.30	21.93	25.56	29.19	32.82	36.44	.363
25	3.79	7.43	11.07	14.71	18.35	21.98	25.62	29.26	32.90	36.54	.364
26	3.80	7.45	11.10	14.75	18.39	22.04	25.69	29.34	32.98	36.63	.365
27	3.81	7.47	11.13	14.78	18.44	22.10	25.75	29.41	33.07	36.72	.366
28	3.82	7.49	11.15	14.82	18.49	22.15	25.82	29.49	33.15	36.82	.367
29	3.83	7.51	11.18	14.86	18.53	22.21	25.88	29.56	33.24	36.91	.368
30	3.84	7.53	11.21	14.90	18.58	22.27	25.95	29.63	33.32	37.00	.368
31	3.85	7.55	11.24	14.93	18.63	22.32	26.02	29.71	33.40	37.10	.369
32	3.86	7.57	11.27	14.97	18.67	22.38	26.08	29.78	33.49	37.19	.370
33	3.87	7.58	11.30	15.01	18.72	22.43	26.15	29.86	33.57	37.28	.371
34	3.88	7.60	11.32	15.05	18.76	22.49	26.21	29.93	33.65	37.38	.372
35	3.89	7.62	11.35	15.08	18.81	22.55	26.28	30.01	33.74	37.47	.373
36	3.90	7.64	11.38	15.12	18.86	22.60	26.34	30.08	33.82	37.56	.374
37	3.91	7.66	11.41	15.16	18.91	22.66	26.41	30.16	33.91	37.66	.375
38	3.92	7.68	11.44	15.20	18.96	22.71	26.47	30.23	33.99	37.75	.376
39	3.93	7.70	11.47	15.23	19.00	22.77	26.54	30.31	34.07	37.84	.377
40	3.94	7.72	11.49	15.27	19.05	22.83	26.60	30.38	34.16	37.94	.378
41	3.95	7.74	11.52	15.31	19.10	22.88	26.67	30.46	34.24	38.03	.379
42	3.96	7.76	11.55	15.35	19.14	22.94	26.73	30.53	34.33	38.12	.380
43	3.97	7.77	11.58	15.38	19.19	22.99	26.80	30.61	34.41	38.22	.380
44	3.98	7.79	11.61	15.42	19.24	23.05	26.87	30.68	34.49	38.31	.381
45	3.99	7.81	11.64	15.46	19.28	23.11	26.93	30.75	34.58	38.40	.382
46	4.00	7.83	11.66	15.50	19.33	23.16	27.00	30.83	34.66	38.50	.383
47	4.01	7.85	11.69	15.53	19.38	23.22	27.06	30.90	34.75	38.59	.384
48	4.02	7.87	11.72	15.57	19.42	23.28	27.13	30.98	34.83	38.68	.385
49	4.03	7.89	11.75	15.61	19.47	23.33	27.19	31.05	34.91	38.77	.386
50	4.04	7.91	11.78	15.65	19.52	23.39	27.26	31.13	35.00	38.87	.387
51	4.05	7.93	11.81	15.68	19.56	23.44	27.32	31.20	35.08	38.96	.388
52	4.06	7.94	11.83	15.72	19.61	23.50	27.39	31.28	35.17	39.05	.389
53	4.07	7.96	11.86	15.76	19.66	23.56	27.45	31.35	35.25	39.15	.390
54	4.08	7.98	11.89	15.80	19.70	23.61	27.52	31.43	35.33	39.24	.391
55	4.09	8.00	11.92	15.83	19.75	23.67	27.58	31.50	35.42	39.33	.392
56	4.10	8.02	11.95	15.87	19.80	23.72	27.65	31.58	35.50	39.43	.393
57	4.10	8.04	11.97	15.91	19.85	23.78	27.72	31.65	35.59	39.52	.393
58	4.11	8.06	12.00	15.95	19.89	23.84	27.78	31.73	35.67	39.61	.394
59	4.12	8.08	12.03	15.98	19.94	23.89	27.85	31.80	35.75	39.71	.395
60	4.13	8.10	12.06	16.02	19.99	23.95	27.91	31.88	35.84	39.80	.396

Angle.	110	120	130	140	150	160	170	180	190	200	D
6° 0′	37.61	41.02	44.42	47.83	51.23	54.64	58.05	61.45	64.86	68.26	.341
1	37.71	41.13	44.54	47.96	51.37	54.79	58.20	61.62	65.04	68.45	.342
2	37.82	41.24	44.67	48.09	51.51	54.94	58.36	61.79	65.21	68.64	.342
3	37.92	41.35	44.79	48.22	51.65	55.09	58.52	61.96	65.39	68.82	.343
4	38.02	41.46	44.91	48.35	51.79	55.24	58.68	62.12	65.57	69.01	.344
5	38.12	41.58	45.03	48.48	51.93	55.39	58.84	62.29	65.74	69.19	.345
6	38.23	41.69	45.15	48.61	52.07	55.53	59.00	62.46	65.92	69.38	.346
7	38.33	41.80	45.27	48.74	52.21	55.68	59.15	62.63	66.10	69.57	.347
8	38.43	41.91	45.39	48.87	52.35	55.83	59.31	62.79	66.27	69.75	.348
9	38.53	42.02	45.51	49.00	52.49	55.98	59.47	62.96	66.45	69.94	.349
10	38.64	42.14	45.63	49.13	52.63	56.13	59.63	63.13	66.63	70.13	.350
11	38.74	42.25	45.76	49.26	52.77	56.28	59.79	63.30	66.80	70.31	.351
12	38.84	42.36	45.88	49.39	52.91	56.43	59.95	63.46	66.98	70.50	.352
13	38.94	42.47	46.00	49.52	53.05	56.58	60.10	63.63	67.16	70.68	.353
14	39.05	42.58	46.12	49.65	53.19	56.73	60.26	63.80	67.33	70.87	.354
15	39.15	42.69	46.24	49.79	53.33	56.88	60.42	63.97	67.51	71.06	.355
16	39.25	42.81	46.36	49.92	53.47	57.02	60.58	64.13	67.69	71.24	.355
17	39.35	42.92	46.48	50.05	53.61	57.17	60.74	64.30	67.86	71.43	.356
18	39.46	43.03	46.60	50.18	53.75	57.32	60.89	64.47	68.04	71.61	.357
19	39.56	43.14	46.72	50.31	53.89	57.47	61.05	64.64	68.22	71.80	.358
20	39.66	43.25	46.85	50.44	54.03	57.62	61.21	64.80	68.40	71.99	.359
21	39.76	43.37	46.97	50.57	54.17	57.77	61.37	64.97	68.57	72.17	.360
22	39.87	43.48	47.09	50.70	54.31	57.92	61.53	65.14	68.75	72.36	.361
23	39.97	43.59	47.21	50.83	54.45	58.07	61.69	65.31	68.93	72.55	.362
24	40.07	43.70	47.33	50.96	54.59	58.22	61.84	65.47	69.10	72.73	.363
25	40.17	43.81	47.45	51.09	54.73	58.37	62.00	65.64	69.28	72.92	.364
26	40.28	43.92	47.57	51.22	54.87	58.51	62.16	65.81	69.46	73.10	.365
27	40.38	44.04	47.69	51.35	55.01	58.66	62.32	65.98	69.63	73.29	.366
28	40.48	44.15	47.81	51.48	55.15	58.81	62.48	66.14	69.81	73.48	.367
29	40.58	44.26	47.94	51.61	55.29	58.96	62.64	66.31	69.99	73.66	.368
30	40.69	44.37	48.06	51.74	55.43	59.11	62.79	66.48	70.16	73.85	.368
31	40.79	44.48	48.18	51.87	55.57	59.26	62.95	66.65	70.34	74.03	.369
32	40.89	44.60	48.30	52.00	55.71	59.41	63.11	66.81	70.52	74.22	.370
33	41.00	44.71	48.42	52.13	55.84	59.56	63.27	66.98	70.69	74.41	.371
34	41.10	44.82	48.54	52.26	55.98	59.71	63.43	67.15	70.87	74.59	.372
35	41.20	44.93	48.66	52.39	56.12	59.86	63.59	67.32	71.05	74.78	.373
36	41.30	45.04	48.78	52.52	56.26	60.00	63.74	67.48	71.22	74.96	.374
37	41.41	45.15	48.90	52.65	56.40	60.15	63.90	67.65	71.40	75.15	.375
38	41.51	45.27	49.03	52.78	56.54	60.30	64.06	67.82	71.58	75.34	.376
39	41.61	45.38	49.15	52.91	56.68	60.45	64.22	67.99	71.75	75.52	.377
40	41.71	45.49	49.27	53.05	56.82	60.60	64.38	68.15	71.93	75.71	.378
41	41.82	45.60	49.39	53.18	56.96	60.75	64.54	68.32	72.11	75.90	.379
42	41.92	45.71	49.51	53.31	57.10	60.90	64.69	68.49	72.29	76.08	.380
43	42.02	45.83	49.63	53.44	57.24	61.05	64.85	68.66	72.46	76.27	.380
44	42.12	45.94	49.75	53.57	57.38	61.20	65.01	68.82	72.64	76.45	.381
45	42.23	46.05	49.87	53.70	57.52	61.35	65.17	68.99	72.82	76.64	.382
46	42.33	46.16	49.99	53.83	57.66	61.49	65.33	69.16	72.99	76.83	.383
47	42.43	46.27	50.12	53.96	57.80	61.64	65.48	69.33	73.17	77.01	.384
48	42.53	46.38	50.24	54.09	57.94	61.79	65.64	69.49	73.35	77.20	.385
49	42.64	46.50	50.36	54.22	58.08	61.94	65.80	69.66	73.52	77.38	.386
50	42.74	46.61	50.48	54.35	58.22	62.09	65.96	69.83	73.70	77.57	.387
51	42.84	46.72	50.60	54.48	58.36	62.24	66.12	70.00	73.88	77.76	.388
52	42.94	46.83	50.72	54.61	58.50	62.39	66.28	70.17	74.05	77.94	.389
53	43.05	46.94	50.84	54.74	58.64	62.54	66.43	70.33	74.23	78.13	.390
54	43.15	47.06	50.96	54.87	58.78	62.69	66.59	70.50	74.41	78.31	.391
55	43.25	47.17	51.08	55.00	58.92	62.83	66.75	70.67	74.58	78.50	.392
56	43.35	47.28	51.21	55.13	59.06	62.98	66.91	70.84	74.76	78.69	.393
57	43.46	47.39	51.33	55.26	59.20	63.13	67.07	71.00	74.94	78.87	.393
58	43.56	47.50	51.45	55.39	59.34	63.28	67.23	71.17	75.11	79.06	.394
59	43.66	47.61	51.57	55.52	59.48	63.43	67.38	71.34	75.29	79.25	.395
60	43.76	47.72	51.69	55.65	59.62	63.58	67.54	71.51	75.47	79.43	.396

Angle.	210	220	230	240	250	260	270	280	290	300	D
6° 0′	71.67	75.08	78.48	81.89	85.29	88.70	92.11	95.51	98.92	102.32	.341
1	71.86	75.28	78.70	82.11	85.53	88.94	92.36	95.77	99.13	102.60	.342
2	72.06	75.49	78.91	82.33	85.76	89.10	92.61	96.03	99.46	102.88	.342
3	72.26	75.69	79.12	82.56	85.99	89.43	92.86	96.29	99.73	103.16	.343
4	72.45	75.89	79.34	82.78	86.22	89.67	93.11	96.55	100.00	103.44	.344
5	72.65	76.10	79.55	83.00	86.46	89.91	93.36	96.81	100.27	103.72	.345
6	72.84	76.30	79.77	83.23	86.69	90.15	93.61	97.07	100.54	104.00	.346
7	73.04	76.51	79.98	83.45	86.92	90.39	93.86	97.33	100.81	104.28	.347
8	73.23	76.71	80.19	83.67	87.15	90.63	94.11	97.59	101.08	104.56	.348
9	73.43	76.92	80.41	83.90	87.39	90.88	94.37	97.85	101.34	104.83	.349
10	73.62	77.12	80.62	84.12	87.62	91.12	94.62	98.12	101.61	105.11	.350
11	73.82	77.33	80.84	84.34	87.85	91.36	94.87	98.38	101.88	105.39	.351
12	74.02	77.53	81.05	84.57	88.08	91.60	95.12	98.64	102.15	105.67	.352
13	74.21	77.74	81.26	84.79	88.32	91.84	95.37	98.90	102.42	105.95	.353
14	74.41	77.94	81.48	85.01	88.55	92.09	95.62	99.16	102.69	106.23	.354
15	74.60	78.15	81.69	85.24	88.78	92.33	95.87	99.42	102.96	106.51	.355
16	74.80	78.35	81.91	85.46	89.01	92.57	96.12	99.68	103.23	106.79	.355
17	74.99	78.56	82.12	85.68	89.25	92.81	96.37	99.94	103.50	107.07	.356
18	75.19	78.76	82.33	85.91	89.48	93.05	96.63	100.20	103.77	107.35	.357
19	75.38	78.97	82.55	86.13	89.71	93.29	96.88	100.46	104.04	107.62	.358
20	75.58	79.17	82.76	86.35	89.94	93.54	97.13	100.72	104.31	107.90	.359
21	75.77	79.37	82.98	86.58	90.18	93.78	97.38	100.98	104.58	108.18	.360
22	75.97	79.58	83.19	86.80	90.41	94.02	97.64	101.24	104.85	108.46	.361
23	76.16	79.78	83.40	87.02	90.64	94.26	97.89	101.50	105.12	108.74	.362
24	76.36	79.99	83.62	87.25	90.87	94.50	98.14	101.76	105.39	109.02	.363
25	76.56	80.19	83.83	87.47	91.11	94.75	98.38	102.02	105.66	109.30	.364
26	76.75	80.40	84.05	87.69	91.34	94.99	98.63	102.28	105.93	109.58	.365
27	76.95	80.60	84.26	87.92	91.57	95.23	98.89	102.54	106.20	109.86	.366
28	77.14	80.81	84.47	88.14	91.80	95.47	99.14	102.80	106.47	110.14	.367
29	77.34	81.01	84.69	88.36	92.04	95.71	99.39	103.06	106.74	110.41	.368
30	77.53	81.22	84.90	88.59	92.27	95.96	99.64	103.32	107.01	110.69	.368
31	77.73	81.42	85.12	88.81	92.50	96.20	99.89	103.58	107.28	110.97	.369
32	77.92	81.63	85.33	89.03	92.74	96.44	100.14	103.84	107.55	111.25	.370
33	78.12	81.83	85.54	89.26	92.97	96.68	100.39	104.11	107.82	111.53	.371
34	78.31	82.04	85.76	89.48	93.20	96.92	100.64	104.37	108.09	111.81	.372
35	78.51	82.24	85.97	89.70	93.43	97.16	100.89	104.63	108.36	112.09	.373
36	78.71	82.45	86.19	89.93	93.67	97.41	101.15	104.89	108.63	112.37	.374
37	78.90	82.65	86.40	90.15	93.90	97.65	101.40	105.15	108.90	112.65	.375
38	79.10	82.85	86.61	90.37	94.13	97.89	101.65	105.41	109.17	112.93	.376
39	79.29	83.06	86.83	90.59	94.36	98.13	101.90	105.67	109.44	113.20	.377
40	79.50	83.26	87.04	90.82	94.60	98.37	102.15	105.93	109.71	113.48	.378
41	79.68	83.47	87.26	91.04	94.83	98.62	102.40	106.19	109.97	113.76	.379
42	79.88	83.67	87.47	91.26	95.06	98.86	102.65	106.45	110.24	114.04	.380
43	80.07	83.88	87.68	91.49	95.29	99.10	102.90	106.71	110.51	114.32	.380
44	80.27	84.08	87.90	91.71	95.53	99.34	103.15	106.97	110.78	114.60	.381
45	80.46	84.29	88.11	91.93	95.76	99.58	103.41	107.23	111.05	114.88	.382
46	80.66	84.49	88.33	92.16	95.99	99.82	103.66	107.49	111.32	115.16	.383
47	80.85	84.70	88.54	92.38	96.22	100.07	103.91	107.75	111.59	115.44	.384
48	81.05	84.90	88.75	92.60	96.46	100.31	104.16	108.01	111.86	115.71	.385
49	81.25	85.11	88.97	92.83	96.69	100.55	104.41	108.27	112.13	115.99	.386
50	81.44	85.31	89.18	93.05	96.92	100.79	104.66	108.53	112.40	116.27	.387
51	81.64	85.52	89.40	93.27	97.15	101.03	104.91	108.79	112.67	116.55	.388
52	81.83	85.72	89.61	93.50	97.39	101.28	105.16	109.05	112.94	116.83	.389
53	82.03	85.92	89.82	93.72	97.62	101.52	105.42	109.31	113.21	117.11	.390
54	82.22	86.13	90.04	93.94	97.85	101.76	105.67	109.57	113.48	117.39	.391
55	82.42	86.33	90.25	94.17	98.08	102.00	105.92	109.83	113.75	117.67	.392
56	82.61	86.54	90.46	94.39	98.32	102.25	106.17	110.09	114.02	117.95	.393
57	82.81	86.74	90.68	94.61	98.55	102.48	106.42	110.35	114.29	118.23	.393
58	83.00	86.95	90.89	94.84	98.78	102.73	106.67	110.62	114.56	118.50	.394
59	83.20	87.15	91.11	95.06	99.01	102.97	106.92	110.88	114.83	118.78	.395
60	83.39	87.36	91.32	95.28	99.25	103.21	107.17	111.14	115.10	119.06	.396

Angle.	310	320	330	340	350	360	370	380	390	400	D
6° 0′	105.73	109.14	112.54	115.95	119.35	122.76	126.16	129.57	132.98	136.38	.341
1	106.02	109.43	112.85	116.26	119.68	123.09	126.51	129.92	133.34	136.75	.342
2	106.31	109.73	113.15	116.58	120.00	123.43	126.85	130 28	133.70	137.13	.342
3	106.59	110.03	113.46	116.90	120.33	123.77	127.20	130.63	134.06	137.50	.343
4	106.88	110.33	113.77	117.21	120.65	124.10	127.54	130.98	134.43	137.87	.344
5	107.17	110.62	114.08	117.53	120.98	124.43	127.88	131.34	134.79	138.24	.345
6	107.46	110.92	114.38	117.84	121.31	124.77	128.23	131.69	135.15	138.61	.346
7	107.75	111.22	114.69	118.16	121.63	125.10	128.57	132.04	135.51	138.99	.347
8	108.03	111.52	115.00	118.48	121.96	125.44	128.92	132.40	135.88	139.36	.348
9	108.32	111.81	115.30	118.79	122.28	125.77	129.26	132.75	136.24	139.73	.349
10	108.61	112.11	115.61	119.11	122.61	126.11	129.60	133.10	136.60	140.10	.350
11	108.90	112.41	115.92	119.42	122.93	126.44	129.95	133.46	136.96	140.47	.351
12	109.19	112.71	116.22	119.74	123.26	126.78	130.29	133.81	137.33	140.84	.352
13	109.48	113.00	116.53	120.06	123.58	127.11	130.64	134.16	137.69	141.22	.353
14	109.76	113.30	116.84	120.37	123.91	127.44	130.98	134.52	138.05	141.59	.354
15	110.05	113.60	117.14	120.69	124.23	127.78	131.32	134.87	138.41	141.96	.355
16	110.34	113.90	117.45	121.00	124.56	128.11	131.67	135.22	138.78	142.33	.355
17	110.63	114.19	117.76	121.32	124.88	128.45	132.01	135.58	139.14	142.70	.356
18	110.92	114.49	118.06	121.64	125.21	128.78	132.36	135.93	139.50	143.08	.357
19	111.21	114.80	118.37	121.95	125.54	129.12	132.70	136.28	139.86	143.44	.358
20	111.49	115.09	118.68	122.27	125.86	129.45	133.04	136.64	140.23	143.82	.359
21	111 78	115.38	118.98	122.59	126.19	129.79	133.39	136.99	140.59	144.19	.360
22	112.07	115.68	119.29	122.90	126.51	130.12	133.73	137.34	140.95	144.56	.361
23	112.36	115.98	119.60	123.22	126.84	130.46	134.08	137.70	141.32	144.93	.362
24	112.65	116.28	119.91	123.53	127.16	130.79	134.42	138.05	141.68	145.31	.363
25	112.94	116.57	120.21	123.85	127.49	131.13	134.76	138.40	142.04	145.68	.364
26	113.22	116.87	120.52	124.17	127.81	131.46	135.11	138.76	142.40	146.05	.365
27	113.51	117.17	120.83	124.48	128.14	131.80	135.45	139.11	142.77	146.42	.366
28	113.80	117.47	121.13	124.80	128.46	132.13	135.80	139.46	143.13	146.79	.367
29	114.09	117.76	121.44	125.11	128.79	132.46	136.14	139.82	143.49	147.17	.368
30	114.38	118.06	121.75	125.43	129.12	132.80	136.48	140.17	143.85	147.54	.368
31	114.67	118.36	122.05	125.75	129.44	133.13	136.83	140.52	144.22	147.91	.369
32	114.95	118.66	122.36	126.06	129.77	133.47	137.17	140.88	144.58	148.28	.370
33	115.24	118.95	122.67	126.38	130.09	133.80	137.52	141.23	144.94	148.65	.371
34	115.53	119.25	122.97	26.70	130.42	134.14	137.86	141.58	145.30	149.02	.372
35	115.82	119.55	123.28	127.01	130.74	134.47	138.20	141.94	145.67	149.40	.373
36	116.11	119.85	123.59	127.33	131.07	134.81	138.55	142.29	146.03	149.77	.374
37	116.39	120.14	123.89	127.64	131.39	135.14	138.89	142.64	146.39	150.14	.375
38	116.68	120.44	124.20	127.96	131.72	135.48	139.24	143.00	146.75	150.51	.376
39	116.97	120.74	124.51	128.28	132.04	135.81	139.58	143.35	147.12	150.88	.377
40	117.26	121.04	124.81	128.59	132.37	136.15	139.92	143.70	147.48	151.26	.378
41	117.55	121.33	125.12	128.91	132.69	136.48	140.27	144.05	147.84	151.63	.379
42	117.84	121.63	125.43	129.22	133.02	136.82	140.61	144.41	148.20	152.00	.380
43	118.12	121.93	125.74	129.54	133.35	137.15	140.96	144.76	148.57	152.37	.380
44	118.41	122.23	126.04	129.86	133.67	137.49	141.30	145.11	148.93	152.74	.381
45	118.70	122.52	126.35	130.17	134.00	137.82	141.64	145.47	149.29	153.12	.382
46	118.99	122.82	126.66	130.49	134.32	138.15	141.99	145.82	149.65	153.49	.383
47	119.28	123.12	126.96	130.80	134.65	138.49	142.33	146.17	150.02	153.86	.384
48	119.57	123.42	127.27	131.12	134.97	138.82	142.68	146.53	150.38	154.23	.385
49	119.85	123.71	127.58	131.44	135.30	139.16	143.02	146.88	150.74	154.60	.386
50	120.14	124.01	127.88	131.75	135.62	139.49	143.36	147.23	151.10	154.97	.387
51	120.43	124.31	128.19	132.07	135.95	139.83	143.71	147.59	151.47	155.35	.388
52	120.72	124.61	128.50	132.39	136.27	140.16	144.05	147.94	151.83	155.72	.389
53	121.01	124.91	128.80	132.70	136.60	140.50	144.40	148.29	152.19	156.09	.390
54	121.30	125.20	129.11	133.02	136.93	140.83	144.74	148.65	152.55	156.46	.391
55	121.58	125.50	129.42	133.33	137.25	141.17	145.08	149.00	152.92	156.83	.392
56	121.87	125.80	129.72	133.65	137.58	141.50	145.43	149.35	153.28	157.21	.393
57	122.16	126.10	130.03	133.97	137.90	141.84	145.77	149.71	153.64	157.58	.393
58	122.45	126.39	130.34	134.28	138.23	142.17	146.12	150.06	154.00	157.95	.394
59	122.74	126.69	130.64	134.60	138.55	142.51	146.46	150.41	154.37	158.32	.395
60	123.03	126.99	130.95	134.91	138.88	142.84	146.80	150.77	154.73	158.69	.396

Angle.	410	420	430	440	450	460	470	480	490	500	D
6° 0′	139.79	143.19	146.60	150.01	153.41	156.82	160.22	163.63	167.04	170.44	.341
1	140.17	143.58	147.00	150.42	153.83	157.25	160.66	164.08	167.49	170.91	.342
2	140.55	143.98	147.40	150.82	154.25	157.67	161.10	164.52	167.95	171.37	.342
3	140.93	144.37	147.80	151.23	154.67	158.10	161.53	164.97	168.40	171.84	.343
4	141.31	144.76	148.20	151.64	155.08	158.53	161.97	165.41	168.86	172.30	.344
5	141.69	145.15	148.60	152.05	155.50	158.96	162.41	165.86	169.31	172.76	.345
6	142.07	145.54	149.00	152.46	155.92	159.38	162.84	166.31	169.77	173.23	.346
7	142.46	145.93	149.40	152.87	156.34	159.81	163.28	166.75	170.22	173.69	.347
8	142.84	146.32	149.80	153.28	156.76	160.24	163.72	167.20	170.68	174.16	.348
9	143.22	146.71	150.20	153.69	157.18	160.67	164.15	167.64	171.13	174.62	.349
10	143.60	147.10	150.60	154.10	157.59	161.09	164.59	168.09	171.59	175.09	.350
11	143.98	147.49	151.00	154.50	158.01	161.52	165.03	168.54	172.05	175.55	.351
12	144.36	147.88	151.40	154.91	158.43	161.94	165.47	168.98	172.50	176.02	.352
13	144.74	148.27	151.80	155.32	158.85	162.38	165.90	169.43	172.96	176.48	.353
14	145.12	148.66	152.20	155.73	159.27	162.80	166.34	169.88	173.41	176.95	.354
15	145.51	149.05	152.60	156.14	159.69	163.23	166.78	170.32	173.87	177.41	.355
16	145.89	149.44	153.00	156.55	160.10	163.66	167.21	170.77	174.32	177.88	.355
17	146.27	149.83	153.39	156.96	160.52	164.09	167.65	171.21	174.78	178.34	.356
18	146.65	150.22	153.79	157.37	160.94	164.51	168.09	171.66	175.23	178.81	.357
19	147.03	150.61	154.19	157.78	161.36	164.94	168.52	172.11	175.69	179.27	.358
20	147.41	151.00	154.59	158.19	161.78	165.37	168.96	172.55	176.14	179.74	.359
21	147.79	151.39	154.99	158.59	162.20	165.80	169.40	173.00	176.60	180.20	.360
22	148.17	151.78	155.39	159.00	162.61	166.22	169.83	173.44	177.05	180.66	.361
23	148.55	152.17	155.79	159.41	163.03	166.65	170.27	173.89	177.51	181.13	.362
24	148.94	152.56	156.19	159.82	163.45	167.08	170.71	174.34	177.97	181.59	.363
25	149.32	152.95	156.59	160.23	163.87	167.51	171.14	174.78	178.42	182.06	.364
26	149.70	153.34	156.99	160.64	164.29	167.93	171.58	175.23	178.88	182.52	.365
27	150.08	153.74	157.39	161.05	164.70	168.36	172.02	175.67	179.33	182.99	.366
28	150.46	154.13	157.79	161.46	165.12	168.79	172.45	176.12	179.79	183.45	.367
29	150.84	154.52	158.19	161.87	165.54	169.22	172.89	176.57	180.24	183.92	.368
30	151.22	154.91	158.59	162.28	165.96	169.64	173.33	177.01	180.70	184.38	.368
31	151.60	155.30	158.99	162.68	166.38	170.07	173.77	177.46	181.15	184.85	.369
32	151.98	155.69	159.39	163.09	166.80	170.50	174.20	177.91	181.61	185.31	.370
33	152.37	156.08	159.79	163.50	167.21	170.93	174.64	178.35	182.06	185.78	.371
34	152.75	156.47	160.19	163.91	167.63	171.35	175.08	178.80	182.52	186.24	.372
35	153.13	156.86	160.59	164.32	168.05	171.78	175.51	179 24	182.97	186.71	.373
36	153.51	157.25	160.99	164.73	168.47	172.21	175.95	179.69	183.43	187.17	.374
37	153.89	157.64	161.39	165.14	168.89	172.64	176.39	180.14	183.89	187.64	.375
38	154.27	158.03	161.79	165.55	169.31	173.06	176.82	180.58	184.34	188.10	.376
39	154.65	158.42	162.19	165.96	169.72	173.49	177.26	181.03	184.80	188.56	.377
40	155.03	158.81	162.59	166.36	170.14	173.92	177.70	181.47	185.25	189.03	.378
41	155.41	159.20	162.99	166.77	170.56	174.35	178.13	181.92	185.71	189.49	.379
42	155.80	159.59	163.39	167.18	170.98	174.77	178.57	182.37	186.16	189.96	.380
43	156.18	159.98	163.79	167.59	171.40	175.20	179.01	182.81	186.62	190.42	.380
44	156.56	160.37	164.19	168.00	171.82	175.63	179.44	183.26	187.07	190.89	.381
45	156.93	160.76	164.59	168.41	172.23	176.06	179.88	183.71	187.53	191.35	.382
46	157.32	161.15	164.99	168.82	172.65	176.48	180.32	184.15	187.98	191.82	.383
47	157.70	161.54	165.39	169.23	173.07	176.91	180.75	184.60	188.44	192.28	.384
48	158.08	161.93	165.79	169.64	173.49	177.34	181.19	185.04	188.90	192.75	.385
49	158.46	162.32	166.19	170.05	173.91	177.77	181.63	185.49	189.35	193.21	.386
50	158.84	162.71	166.58	170.45	174.32	178.20	182.07	185.94	189.81	193.68	.387
51	159.22	163.11	166.98	170.86	174.74	178.62	182.50	186.38	190.26	194.14	.388
52	159.61	163.50	167.38	171.27	175.16	179.05	182.94	186.83	190.72	194.61	.389
53	159.99	163.89	167.78	171.68	175.58	179.48	183.38	187.27	191.17	195.07	.390
54	160.37	164.28	168.18	172.09	176.00	179.91	183.81	187.72	191.63	195.54	.391
55	160.75	164.67	168.58	172.50	176.42	180.33	184.25	188.17	192.08	196.00	.392
56	161.13	165.06	168.98	172.91	176.83	180.76	184.69	188.61	192.54	196.46	.393
57	161.51	165.45	169.38	173.32	177.25	181.19	185.12	189.06	192.99	196.93	.393
58	161.89	165.84	169.78	173.73	177.67	181.62	185.56	189.50	193.45	197.39	.394
59	162.27	166.23	170.18	174.14	178.09	182.04	186.00	189.95	193.90	197.86	.395
60	162.66	166.62	170.58	174.55	178.51	182.47	186.43	190.40	194.36	198.32	.396

Angle.	10	20	30	40	50	60	70	80	90	100	D
7° 0′	4.13	8.10	12.06	16.02	19.99	23.95	27.91	31.88	35.84	39.80	.396
1	4.14	8.12	12.09	16.06	20.03	24.00	27.98	31.95	35.92	39.89	.397
2	4.15	8.13	12.12	16.10	20.08	24.06	28.04	32.02	36.00	39.99	.398
3	4.16	8.15	12.14	16.13	20.13	24.12	28.11	32.10	36.09	40.08	.399
4	4.17	8.17	12.17	16.17	20.17	24.17	28.17	32.17	36.17	40.17	.400
5	4.18	8.19	12.20	16.21	20.22	24.23	28.24	32.25	36.25	40.26	.401
6	4.19	8.21	12 23	16.25	20.26	24.28	28.30	32.32	36.34	40.36	.402
7	4.20	8.23	12.26	16.28	20.31	24.34	28.37	32.39	36.42	40.45	.403
8	4.21	8.25	12.28	16.32	20.36	24.39	28.43	32.47	36.50	40.54	.404
9	4.22	8.27	12.31	16.36	20.40	24.45	28.50	32.54	36.59	40.63	.405
10	4.23	8.28	12.34	16.40	20.45	24.51	28.56	32.62	36.67	40.73	.405
11	4.24	8.30	12.37	16.43	20.50	24.56	28 63	32.69	36.75	40.82	.406
12	4.25	8.32	12.40	16.47	20.54	24.62	28.69	32.76	36.84	40.91	.407
13	4.26	8.34	12.42	16.51	20.59	24.67	28.75	32.84	36.92	41.00	.408
14	4.27	8.36	12.45	16.54	20.64	24.73	28.82	32.91	37.00	41.10	.409
15	4 28	8.38	12.48	16.58	20.68	24.78	28.88	32.99	37.09	41.19	.410
16	4.29	8.40	12.51	16.62	20.73	24.84	28.95	33.06	37.17	41.28	.411
17	4.30	8.42	12.54	16.66	20.78	24.89	29.01	33.13	37.25	41.37	.412
18	4.31	8.44	12.56	16.69	20.82	24.95	29.08	33.21	37.34	41.46	.413
19	4.32	8.45	12.59	16.73	20.87	25.01	29.14	33.28	37.42	41.56	.414
20	4.33	8.47	12.62	16.77	20.91	25.06	29.21	33.36	37.50	41.65	.415
21	4.34	8.49	12.65	16.80	20.96	25.12	29.27	33.43	37.59	41.74	.416
22	4.35	8.51	12.68	16.84	21.01	25.17	29.34	33.50	37.67	41.84	.417
23	4.35	8.53	12.70	16.88	21.05	25.23	29.40	33.58	37.75	41.93	.417
24	4.36	8.55	12.73	16.92	21.10	25.28	29.47	33.65	37.84	42.02	.418
25	4.37	8.57	12.76	16.95	21.15	25.34	29.53	33.73	37.92	42.11	.419
26	4 38	8.59	12.79	16.99	21.19	25.40	29.60	33.80	38.00	42.20	.420
27	4.39	8.60	12.82	17.03	21.24	25.45	29.66	33.87	38.09	42.30	.421
28	4.40	8.62	12.84	17.06	21.29	25.51	29.73	33.95	38.17	42.39	.422
29	4.41	8.64	12.87	17.10	21.33	25.56	29.79	34.02	38.25	42.48	.423
30	4.42	8.66	12.90	17.14	21.38	25.62	29.86	34.10	38.34	42.57	.424
31	4.43	8.68	12.93	17.18	21.43	25.67	29.92	34.17	38.42	42.67	.425
32	4.44	8.70	12.96	17.21	21.47	25.73	29.99	34.24	38.50	42.76	.426
33	4.45	8.72	12.98	17.25	21.52	25.78	30.05	34.32	38.59	42.85	.427
34	4.46	8.74	13.01	17.29	21.56	25.84	30.12	34.39	38.67	42.94	.428
35	4.47	8.76	13.04	17.33	21.61	25.90	30.18	34.47	38.75	43.04	.429
36	4.48	8.77	13.07	17.36	21.66	25.95	30.25	34.54	38.83	43.13	.429
37	4.49	8.79	13.10	17.40	21.70	26.01	30.31	34.61	38.92	43.22	.430
38	4.50	8.81	13.12	17.44	21.75	26.06	30.38	34.69	39.00	43.31	.431
39	4.51	8.33	13.15	17.47	21.80	26.12	30.44	34.76	39.08	43.41	.432
40	4.52	8 85	13.18	17.51	21.84	26.17	30.51	34.84	39.17	43.50	.433
41	4.53	8.87	13.21	17.55	21.89	26.23	30.57	34.91	39.25	43.59	.434
42	4.54	8.89	13.24	17.59	21.94	26.29	30.64	34.98	39.33	43.68	.435
43	4.55	8.91	13.26	17.62	21.98	26.34	30.70	35.06	39.42	43.78	.436
44	4.56	8.92	13.29	17.66	22.03	26.40	30.76	35.13	39.50	43.87	.437
45	4.57	8.94	13.32	17.70	22.08	26.45	30.83	35.21	39.58	43.96	.438
46	4.58	8.96	13.35	17.73	22.12	26.51	30.89	35.28	39.67	44.05	.439
47	4.59	8.98	13.38	17.77	22.17	26.56	30.96	35.35	39.75	44.15	.440
48	4.59	9.00	13.40	17.81	22.21	26.62	31.02	35.43	39.83	44.24	.440
49	4.60	9.02	13.43	17.85	22.26	26.67	31.09	35.50	39.92	44.33	.441
50	4.61	9.04	13.46	17.88	22.31	26.73	31.15	35.58	40.00	44.42	.442
51	4.62	9.06	13.49	17.92	22.35	26.79	31.22	35.65	40.08	44.52	.443
52	4.63	9.07	13.52	17.96	22.40	26.84	31.28	35.73	40.17	44.61	.444
53	4.64	9.09	13.54	18.00	22.45	26.90	31.35	35.80	40.25	44.70	.445
54	4.65	9.11	13.57	18.03	22.49	26.95	31.41	35.87	40.33	44.79	.446
55	4.66	9.13	13.60	18.07	22.54	27.01	31.48	35.95	40.42	44.89	.447
56	4.67	9.15	13.63	18.11	22.59	27.06	31.54	36.02	40.50	44.98	.448
57	4.68	9.17	13.66	18.14	22.63	27.12	31.61	36.10	40.58	45.07	.449
58	4.69	9.19	13.68	18.18	22.68	27.18	31.67	36.17	40.67	45.16	.450
59	4.70	9.21	13.71	18.22	22.73	27.23	31.74	36.24	40.75	45.26	.451
60	4.71	9.23	13.74	18.26	22.77	27.29	31.80	36.32	40.83	45.35	.452

Angle.	110	120	130	140	150	160	170	180	190	200	D
7° 0′	43.76	47.73	51.69	55.65	59.62	63.58	67.54	71.51	75.47	79.43	.396
1	43.87	47.84	51.81	55.78	59.75	63.73	67.70	71.67	75.64	79.62	.397
2	43.97	47.95	51.93	55.91	59.89	63.87	67.86	71.84	75.82	79.80	.398
3	44.07	48.06	52.05	56.04	60.03	64.02	68.01	72.00	75.99	79.99	.399
4	44.17	48.17	52.17	56.17	60.17	64.17	68.17	72.17	76.17	80.17	.400
5	44.27	48.28	52.29	56.30	60.31	64.32	68.33	72.34	76.35	80.35	.401
6	44.37	48.39	52.41	56.43	60.45	64.47	68.48	72.50	76.52	80.54	.402
7	44.48	48.50	52.53	56.56	60.59	64.61	68.64	72.67	76.70	80.72	.403
8	44.58	48.61	52.65	56.69	60.72	64.76	68.80	72.83	76.87	80.91	.404
9	44.68	48.72	52.77	56.82	60.86	64.91	68.95	73.00	77.05	81.09	.405
10	44.78	48.84	52.89	56.95	61.00	65.06	69.11	73.17	77.22	81.28	.405
11	44.88	48.95	53.01	57.08	61.14	65.20	69.27	73.33	77.40	81.46	.406
12	44.98	49.06	53.13	57.20	61.28	65.35	69.43	73.50	77.57	81.65	.407
13	45.09	49.17	53.25	57.33	61.42	65.50	69.58	73.66	77.75	81.83	.408
14	45.19	49.28	53.37	57.46	61.56	65.65	69.74	73.83	77.92	82.01	.409
15	45.29	49.39	53.49	57.59	61.69	65.79	69.90	74.00	78.10	82.20	.410
16	45.39	49.50	53.61	57.72	61.83	65.94	70.05	74.16	78.27	82.38	.411
17	45.49	49.61	53.73	57.85	61.97	66.09	70.21	74.33	78.45	82.57	.412
18	45.59	49.72	53.85	57.98	62.11	66.24	70.37	74.50	78.62	82.75	.413
19	45.70	49.83	53.97	58.11	62.25	66.39	70.52	74.66	78.80	82.94	.414
20	45.80	49.94	54.09	58.24	62.39	66.53	70.68	74.83	78.97	83.12	.415
21	45.90	50.06	54.21	58.37	62.52	66.68	70.84	74.99	79.15	83.31	.416
22	46.00	50.17	54.33	58.50	62.66	66.83	70.99	75.16	79.33	83.49	.417
23	46.10	50.28	54.45	58.63	62.80	66.98	71.15	75.33	79.50	83.68	.417
24	46.20	50.39	54.57	58.76	62.94	67.12	71.31	75.49	79.68	83.86	.418
25	46.31	50.50	54.69	58.89	63.08	67.27	71.46	75.66	79.85	84.04	.419
26	46.41	50.61	54.81	59.01	63.22	67.42	71.62	75.82	80.03	84.23	.420
27	46.51	50.72	54.93	59.14	63.36	67.57	71.78	75.99	80.20	84.41	.421
28	46.61	50.83	55.05	59.27	63.49	67.71	71.94	76.16	80.38	84.60	.422
29	46.71	50.94	55.17	59.40	63.63	67.86	72.09	76.32	80.55	84.78	.423
30	46.81	51.05	55.29	59.53	63.77	68.01	72.25	76.49	80.73	84.97	.424
31	46.92	51.16	55.41	59.66	63.91	63.16	72.41	76.65	80.90	85.15	.425
32	47.02	51.27	55.53	59.79	64.05	68.31	72.56	76.82	81.08	85.34	.426
33	47.12	51.39	55.65	59.92	64.19	68.45	72.72	76.99	81.25	85.52	.427
34	47.22	51.50	55.77	60.05	64.32	68.60	72.88	77.15	81.43	85.71	.428
35	47.32	51.61	55.89	60.18	64.46	68.75	73.03	77.32	81.60	85.89	.429
36	47.42	51.72	56.01	60.31	64.60	68.90	73.19	77.48	81.78	86.07	.429
37	47.53	51.83	56.13	60.44	64.74	69.04	73.35	77.65	81.95	86.26	.430
38	47.63	51.94	56.25	60.57	64.88	69.19	73.50	77.82	82.13	86.44	.431
39	47.73	52.05	56.37	60.70	65.02	69.34	73.66	77.98	82.31	86.63	.432
40	47.83	52.16	56.49	60.82	65.16	69.49	73.82	78.15	82.48	86.81	.433
41	47.93	52.27	56.61	60.95	65.29	69.63	73.98	78.32	82.66	87.00	.434
42	48.03	52.38	56.73	61.08	65.43	69.78	74.13	78.48	82.83	87.18	.435
43	48.14	52.49	56.85	61.21	65.57	69.93	74.29	78.65	83.01	87.37	.436
44	48.24	52.60	56.97	61.34	65.71	70.08	74.45	78.81	83.18	87.55	.437
45	48.34	52.72	57.09	61.47	65.85	70.23	74.60	78.98	83.36	87.73	.438
46	48.44	52.83	57.21	61.60	65.99	70.37	74.76	79.15	83.53	87.92	.439
47	48.54	52.94	57.33	61.73	66.13	70.52	74.92	79.31	83.71	88.10	.440
48	48.64	53.05	57.45	61.86	66.26	70.67	75.07	79.48	83.88	88.29	.440
49	48.75	53.16	57.57	61.99	66.40	70.82	75.23	79.64	84.06	88.47	.441
50	48.85	53.27	57.69	62.12	66.54	70.96	75.39	79.81	84.23	88.66	.442
51	48.95	53.38	57.81	62.25	66.68	71.11	75.54	79.98	84.41	88.84	.443
52	49.05	53.49	57.93	62.38	66.82	71.26	75.70	80.14	84.58	89.03	.444
53	49.15	53.60	58.05	62.50	66.96	71.41	75.86	80.31	84.76	89.21	.445
54	49.25	53.71	58.17	62.63	67.09	71.55	76.01	80.47	84.93	89.40	.446
55	49.36	53.82	58.29	62.76	67.23	71.70	76.17	80.64	85.11	89.58	.447
56	49.46	53.94	58.41	62.89	67.37	71.85	76.33	80.81	85.29	89.76	.448
57	49.56	54.05	58.53	63.02	67.51	72.00	76.49	80.97	85.46	89.95	.449
58	49.66	54.16	58.65	63.15	67.65	72.15	76.64	81.14	85.64	90.13	.450
59	49.76	54.27	58.77	63.28	67.79	72.29	76.80	81.31	85.81	90.32	.451
60	49.86	54.38	58.89	63.41	67.93	72.44	76.96	81.47	85.99	90.50	.452

Angle.	210	220	230	240	250	260	270	280	290	300	D
7° 0′	83.39	87.36	91.32	95.28	99.25	103.21	107.17	111.14	115.10	119.06	.396
1	83.59	87.56	91.53	95.51	99.48	103.45	107.42	111.39	115.37	119.34	.397
2	83.78	87.76	91.75	95.73	99.71	103.69	107.67	111.65	115.63	119.62	.398
3	83.98	87.97	91.96	95.95	99.94	103.93	107.92	111.91	115.90	119.89	.399
4	84.17	88.17	92.17	96.17	100.17	104.17	108.17	112.17	116.17	120.17	.400
5	84.36	88.37	92.38	96.39	100.40	104.41	108.42	112.43	116.44	120.44	.401
6	84.56	88.58	92.59	96.61	100.63	104.65	108.67	112.68	116.70	120.72	.402
7	84.75	88.78	92.81	96.83	100.86	104.89	108.92	112.94	116.97	121.00	.403
8	84.94	88.98	93.02	97.05	101.09	105.13	109.16	113.20	117.24	121.27	.404
9	85.14	89.18	93.23	97.28	101.32	105.37	109.41	113.46	117.50	121.55	.405
10	85.33	89.39	93.44	97.50	101.55	105.61	109.66	113.72	117.77	121.83	.405
11	85.53	89.59	93.65	97.72	101.78	105.85	109.91	113.98	118.04	122.10	.406
12	85.72	89.79	93.87	97.94	102.01	106.09	110.16	114.23	118.31	122.38	.407
13	85.91	90.00	94.08	98.16	102.24	106.33	110.41	114.49	118.57	122.66	.408
14	86.11	90.20	94.29	98.38	102.47	106.57	110.66	114.75	118.84	122.93	.409
15	86.30	90.40	94.50	98.60	102.70	106.81	110.91	115.01	119.11	123.21	.410
16	86.49	90.60	94.71	98.83	102.94	107.05	111.16	115.27	119.38	123.49	.411
17	86.69	90.81	94.93	99.05	103.17	107.29	111.40	115.52	119.64	123.76	.412
18	86.88	91.01	95.14	99.27	103.40	107.53	111.65	115.78	119.91	124.04	.413
19	87.08	91.21	95.35	99.49	103.63	107.76	111.90	116.04	120.18	124.32	.414
20	87.27	91.42	95.56	99.71	103.86	108.00	112.15	116.30	120.45	124.59	.415
21	87.46	91.62	95.78	99.93	104.09	108.24	112.40	116.56	120.71	124.87	.416
22	87.66	91.82	95.99	100.15	104.32	108.48	112.65	116.81	120.98	125.15	.417
23	87.85	92.02	96.20	100.37	104.55	108.72	112.90	117.07	121.25	125.42	.417
24	88.04	92.23	96.41	100.60	104.78	108.96	113.15	117.33	121.52	125.70	.418
25	88.24	92.43	96.62	100.82	105.01	109.20	113.40	117.59	121.78	125.98	.419
26	88.43	92.63	96.84	101.04	105.24	109.44	113.65	117.85	122.05	126.25	.420
27	88.62	92.84	97.05	101.26	105.47	109.68	113.89	118.11	122.32	126.53	.421
28	88.82	93.04	97.26	101.48	105.70	109.92	114.14	118.36	122.58	126.81	.422
29	89.01	93.24	97.47	101.70	105.93	110.16	114.39	118.62	122.85	127.08	.423
30	89.21	93.45	97.68	101.92	106.16	110.40	114.64	118.88	123.12	127.36	.424
31	89.40	93.65	97.90	102.15	106.39	110.64	114.89	119.14	123.39	127.64	.425
32	89.59	93.85	98.11	102.37	106.62	110.88	115.14	119.40	123.65	127.91	.426
33	89.79	94.05	98.32	102.59	106.85	111.12	115.39	119.65	123.92	128.19	.427
34	89.98	94.26	98.53	102.81	107.08	111.36	115.64	119.91	124.19	128.47	.428
35	90.17	94.46	98.74	103.03	107.32	111.60	115.89	120.17	124.46	128.74	.429
36	90.37	94.66	98.96	103.25	107.55	111.84	116.13	120.43	124.72	129.02	.429
37	90.56	94.87	99.17	103.47	107.78	112.08	116.38	120.69	124.99	129.29	.430
38	90.76	95.07	99.38	103.69	108.01	112.32	116.63	120.94	125.26	129.57	.431
39	90.95	95.27	99.59	103.92	108.24	112.56	116.88	121.20	125.53	129.85	.432
40	91.14	95.47	99.81	104.14	108.47	112.80	117.13	121.46	125.79	130.12	.433
41	91.34	95.68	100.02	104.36	108.70	113.04	117.38	121.72	126.06	130.40	.434
42	91.53	95.88	100.23	104.58	108.93	113.28	117.63	121.98	126.33	130.68	.435
43	91.72	96.08	100.44	104.80	109.16	113.52	117.88	122.24	126.60	130.95	.436
44	91.92	96.29	100.65	105.02	109.39	113.76	118.13	122.49	126.86	131.23	.437
45	92.11	96.49	100.87	105.24	109.62	114.00	118.38	122.75	127.13	131.51	.438
46	92.31	96.69	101.08	105.46	109.85	114.24	118.62	123.01	127.40	131.78	.439
47	92.50	96.89	101.29	105.69	110.08	114.48	118.87	123.27	127.66	132.06	.440
48	92.69	97.10	101.50	105.91	110.31	114.72	119.12	123.53	127.93	132.34	.440
49	92.89	97.30	101.71	106.13	110.54	114.96	119.37	123.78	128.20	132.61	.441
50	93.08	97.50	101.93	106.35	110.77	115.20	119.62	124.04	128.47	132.89	.442
51	93.27	97.71	102.14	106.57	111.00	115.44	119.87	124.30	128.73	133.17	.443
52	93.47	97.91	102.35	106.79	111.23	115.68	120.12	124.56	129.00	133.44	.444
53	93.66	98.11	102.56	107.01	111.46	115.92	120.37	124.82	129.27	133.72	.445
54	93.86	98.32	102.78	107.24	111.70	116.16	120.62	125.08	129.54	134.00	.446
55	94.05	98.52	102.99	107.46	111.93	116.40	120.86	125.33	129.80	134.27	.447
56	94.24	98.71	103.20	107.68	112.16	116.64	121.11	125.59	130.07	134.55	.448
57	94.44	98.91	103.41	107.90	112.39	116.87	121.36	125.85	130.34	134.83	.449
58	94.63	99.12	103.62	108.12	112.62	117.11	121.61	126.11	130.61	135.10	.450
59	94.82	99.32	103.84	108.34	112.85	117.35	121.86	126.37	130.87	135.38	.451
60	95.02	99.53	104.05	108.56	113.08	117.59	122.11	126.62	131.14	135.66	.452

Angle.	310	320	330	340	350	360	370	380	390	400	D
7° 0′	123.03	126.99	130.95	134.91	138.88	142.84	146.80	150.77	154.73	158.69	.396
1	123.31	127.28	131.26	135.23	139.20	143.17	147.14	151.12	155.09	159.06	.397
2	123.60	127.58	131.56	135.54	139.52	143.50	147.49	151.47	155.45	159.43	.398
3	123.88	127.87	131.86	135.85	139.85	143.84	147.83	151.82	155.81	159.80	.399
4	124.17	128.17	132.17	136.17	140.17	144.17	148.17	152.17	156.17	160.17	.400
5	124.45	128.46	132.47	136.48	140.49	144.50	148.51	152.52	156.53	160.54	.401
6	124.74	128.76	132.78	136.79	140.81	144.83	148.85	152.87	156.83	160.90	.402
7	125.03	129.05	133.08	137.11	141.14	145.16	149.19	153.22	157.25	161.27	.403
8	125.31	129.35	133.39	137.42	141.46	145.49	149.53	153.57	157.60	161.64	.404
9	125.60	129.64	133.69	137.73	141.78	145.83	149.87	153.92	157.96	162.01	.405
10	125.88	129.94	133.99	138.05	142.10	146.16	150.21	154.27	158.32	162.38	.405
11	126.17	130.23	134.30	138.36	142.43	146.49	150.55	154.62	158.68	162.75	.406
12	126.45	130.53	134.60	138.68	142.75	146.82	150.90	154.97	159.04	163.12	.407
13	126.74	130.82	134.91	138.99	143.07	147.15	151.24	155.32	159.40	163.48	.408
14	127.03	131.12	135.21	139.30	143.39	147.49	151.58	155.67	159.76	163.85	.409
15	127.31	131.41	135.51	139.62	143.72	147.82	151.92	156.02	160.12	164.22	.410
16	127.60	131.71	135.82	139.93	144.04	148.15	152.26	156.37	160.48	164.59	.411
17	127.88	132.00	136.12	140.24	144.36	148.48	152.60	156.72	160.84	164.96	.412
18	128.17	132.30	136.43	140.56	144.68	148.81	152.94	157.07	161.20	165.33	.413
19	128.45	132.59	136.73	140.87	145.01	149.14	153.28	157.42	161.56	165.70	.414
20	128.74	132.89	137.03	141.18	145.33	149.48	153.62	157.77	161.92	166.07	.415
21	129.03	133.18	137.34	141.50	145.65	149.81	153.96	158.12	162.28	166.43	.416
22	129.31	133.48	137.64	141.81	145.97	150.14	154.31	158.47	162.64	166.80	.417
23	129.60	133.77	137.95	142.12	146.30	150.47	154.65	158.82	163.00	167.17	.417
24	129.88	134.07	138.25	142.44	146.62	150.80	154.99	159.17	163.36	167.54	.418
25	130.17	134.36	138.56	142.75	146.94	151.14	155.33	159.52	163.71	167.91	.419
26	130.45	134.66	138.86	143.06	147.26	151.47	155.67	159.87	164.07	168.28	.420
27	130.74	134.95	139.16	143.38	147.59	151.80	156.01	160.22	164.43	168.65	.421
28	131.03	135.25	139.47	143.69	147.91	152.13	156.35	160.57	164.79	169.01	.422
29	131.31	135.54	139.77	144.00	148.23	152.46	156.69	160.92	165.15	169.38	.423
30	131.60	135.84	140.08	144.32	148.55	152.79	157.03	161.27	165.51	169.75	.424
31	131.88	136.13	140.38	144.63	148.88	153.13	157.37	161.62	165.87	170.12	.425
32	132.17	136.43	140.68	144.94	149.20	153.46	157.72	161.97	166.23	170.49	.426
33	132.46	136.72	140.99	145.26	149.52	153.79	158.06	162.32	166.59	170.86	.427
34	132.74	137.02	141.29	145.57	149.85	154.12	158.40	162.67	166.95	171.23	.428
35	133.03	137.31	141.60	145.88	150.17	154.45	158.74	163.02	167.31	171.59	.429
36	133.31	137.61	141.90	146.20	150.49	154.79	159.08	163.37	167.67	171.96	.429
37	133.60	137.90	142.21	146.51	150.81	155.12	159.42	163.72	168.03	172.33	.430
38	133.88	138.20	142.51	146.82	151.14	155.45	159.76	164.07	168.39	172.70	.431
39	134.17	138.49	142.81	147.14	151.46	155.78	160.10	164.42	168.75	173.07	.432
40	134.46	138.79	143.12	147.45	151.78	156.11	160.44	164.77	169.11	173.44	.433
41	134.74	139.08	143.42	147.76	152.10	156.44	160.78	165.12	169.47	173.81	.434
42	135.03	139.38	143.73	148.08	152.43	156.78	161.13	165.48	169.82	174.17	.435
43	135.31	139.67	144.03	148 39	152.75	157.11	161.47	165.83	170.18	174.54	.436
44	135.60	139.97	144.34	148.70	153.07	157.44	161.81	166.18	170.54	174.92	.437
45	135.88	140.26	144.64	149.02	153.39	157.77	162.15	166.53	170.90	175.28	.438
46	136.17	140.56	144.94	149.33	153.72	158.10	162.49	166.88	171.26	175.65	.439
47	136.46	140.85	145.25	149.64	154.04	158.43	162.83	167.23	171.62	176.02	.440
48	136.74	141.15	145.55	149.96	154.36	158.77	163.17	167.58	171.98	176.39	.440
49	137.03	141.44	145.86	150.27	154.68	159.10	163.51	167.93	172.34	176.75	.441
50	137.31	141.74	146.16	150.58	155.01	159.43	163.85	168.28	172.70	177.12	.442
51	137.60	142.03	146.46	150.90	155.33	159.76	164.19	168.63	173.06	177.49	.443
52	137.88	142.33	146.77	151.21	155.65	160.09	164.54	168.98	173.42	177.86	.444
53	138.17	142.62	147.07	151.52	155.97	160.43	164.88	169.33	173.78	178.23	.445
54	138.46	142.92	147.38	151.84	156.30	160.76	165.22	169.68	174.14	178.60	.446
55	138.74	143.21	147.68	152.15	156.62	161.09	165.56	170.03	174.50	178.97	.447
56	139.03	143.51	147.99	152.46	156.94	161.42	165.90	170.38	174.86	179.33	.448
57	139.31	143.80	147.29	152.78	157.26	161.75	166.24	170.73	175.22	179.70	.449
58	139.60	144.10	148.59	153.09	157.59	162.08	166.58	171.08	175.57	180.07	.450
59	139.88	144.39	148.90	153.40	157.91	162.42	166.92	171.43	175.93	180.44	.451
60	140.17	144.69	149.20	153.72	158.23	162.75	167.26	171.78	176.29	180.81	.452

Angle.	410	420	430	440	450	460	470	480	490	500	D
7° 0′	162.66	166.62	170.58	174.55	178.51	182.47	186.43	190.40	194.36	198.32	.396
1	163.03	167.01	170.98	174.95	178.92	182.89	186.87	190.84	194.81	198.78	.397
2	163.41	167.39	171.37	175.36	179.34	183.32	187.30	191.28	195.26	199.24	.398
3	163.79	167.78	171.77	175.76	179.75	183.74	187.73	191.72	195.71	199.71	.399
4	164.17	168.17	172.17	176.17	180.17	184.17	188.17	192.17	196.17	200.17	.400
5	164.54	168.55	172.56	176.57	180.58	184.59	188.60	192.61	196.62	200.63	.401
6	164.92	168.94	172.96	176.98	181.00	185.01	189.03	193.05	197.07	201.09	.402
7	165.30	169.33	173.36	177.38	181.41	185.44	189.47	193.49	197.52	201.55	.403
8	165.68	169.71	173.75	177.79	181.82	185.86	189.90	193.93	197.97	202.01	.404
9	166.06	170.10	174.15	178.19	182.24	186.29	190.33	194.38	198.42	202.47	.405
10	166.43	170.49	174.54	178.60	182.65	186.71	190.76	194.82	198.87	202.93	.405
11	166.81	170.88	174.94	179.00	183.06	187.13	191.20	195.26	199.33	203.39	.406
12	167.19	171.26	175.34	179.41	183.48	187.56	191.63	195.70	199.78	203.85	.407
13	167.57	171.65	175.73	179.82	183.90	187.98	192.06	196.15	200.23	204.31	.408
14	167.95	172.04	176.13	180.22	184.31	188.40	192.50	196.59	200.68	204.77	.409
15	168.32	172.42	176.53	180.63	184.73	188.83	192.93	197.05	201.13	205.23	.410
16	168.70	172.81	176.92	181.03	185.14	189.25	193.36	197.47	201.58	205.69	.411
17	169.08	173.20	177.32	181.44	185.56	189.68	193.80	197.92	202.03	206.15	.412
18	169.46	173.59	177.71	181.84	185.97	190.10	194.23	198.36	202.49	206.61	.413
19	169.83	173.97	178.11	182.25	186.39	190.52	194.66	198.80	202.94	207.08	.414
20	170.21	174.36	178.51	182.65	186.80	190.95	195.09	199.24	203.39	207.54	.415
21	170.59	174.75	178.90	183.06	187.22	191.37	195.53	199.68	203.84	208.00	.416
22	170.97	175.13	179.30	183.46	187.63	191.80	195.96	200.13	204.29	208.46	.417
23	171.35	175.52	179.69	183.87	188.04	192.22	196.30	200.57	204.74	208.92	.417
24	171.72	175.91	180.09	184.28	188.46	192.64	196.83	201.01	205.19	209.38	.418
25	172.10	176.29	180.49	184.68	188.87	193.07	197.26	201.45	205.65	209.84	.419
26	172.48	176.68	180.88	185.09	189.29	193.49	197.69	201.90	206.10	210.30	.420
27	172.86	177.07	181.28	185.49	189.70	193.91	198.13	202.34	206.55	210.76	.421
28	173.23	177.46	181.68	185.90	190.12	194.34	198.56	202.78	207.00	211.22	.422
29	173.61	177.84	182.07	186.30	190.53	194.76	198.99	203.22	207.45	211.68	.423
30	173.99	178.23	182.47	186.71	190.95	195.19	199.43	203.66	207.90	212.14	.424
31	174.37	178.62	182.86	187.11	191.36	195.61	199.86	204.11	208.36	212.60	.425
32	174.75	179.00	183.26	187.52	191.78	196.03	200.29	204.55	208.81	213.06	.426
33	175.12	179.39	183.66	187.92	192.19	196.46	200.72	204.99	209.26	213.52	.427
34	175.50	179.78	184.05	188.33	192.61	196.88	201.16	205.43	209.71	213.99	.428
35	175.88	180.16	184.45	188.73	193.02	197.31	201.59	205.88	210.16	214.45	.429
36	176.26	180.55	184.85	189.14	193.43	197.73	202.02	206.32	210.61	214.91	.429
37	176.63	180.94	185.24	189.55	193.85	198.15	202.46	206.76	211.06	215.37	.430
38	177.01	181.33	185.64	189.95	194.26	198.58	202.89	207.20	211.51	215.83	.431
39	177.39	181.71	186.03	190.36	194.68	199.00	203.32	307.64	211.97	216.29	.432
40	177.77	182.10	186.43	190.76	195.09	199.42	203.76	208.09	212.42	216.75	.433
41	178.15	182.49	186.83	191.17	195.51	199.85	204.19	208.53	212.87	217.21	.434
42	178.52	182.87	187.22	191.57	195.92	200.27	204.62	208.97	213.32	217.67	.435
43	178.90	183.26	187.62	191.98	196.34	200.70	205.05	209.41	213.77	218.13	.436
44	179.28	183.65	188.02	192.38	196.75	201.12	205.49	209.86	214.22	218.59	.437
45	179.66	184.03	188.41	192.79	197.17	201.54	205.92	210.30	214.68	219.05	.438
46	180.04	184.42	188.81	193.19	197.58	201.97	206.35	210.74	215.13	219.51	.439
47	180.41	184.81	189.20	193.60	198.00	202.39	206.79	211.18	215.58	219.97	.440
48	180.79	185.20	189.60	194.01	198.41	202.82	207.22	211.62	216.03	220.43	.440
49	181.17	185.58	190.00	194.41	198.82	203.24	207.65	212.07	216.48	220.90	.441
50	181.55	185.97	190.39	194.82	199.24	203.66	208.09	212.51	216.93	221.36	.442
51	181.92	186.36	190.79	195.22	199.65	204.09	208.52	212.95	217.38	221.82	.443
52	182.30	186.74	191.19	195.63	200.07	204.51	208.95	213.39	217.84	222.28	.444
53	182.68	187.13	191.58	196.03	200.48	204.93	209.39	213.84	218.29	222.74	.445
54	183.06	187.52	191.98	196.44	200.90	205.36	209.82	214.28	218.74	223.20	.446
55	183 44	187.90	192.37	196.84	201.31	205.78	210.25	214.72	219.19	223.66	.447
56	183.81	188.29	192.77	197.25	201.73	206.21	210.68	215.16	219.64	224.12	.448
57	184.19	188.68	193.17	197.65	202.14	206.63	211.12	215.61	220.09	224.58	.449
58	184.57	189.07	193.56	198.06	202.56	207.05	211.55	216.05	220.54	225.04	.450
59	184.95	189.45	193.96	198.47	202.97	207.48	211.98	216.49	221.00	225.50	.451
60	185.32	189.84	194.36	198.87	203.39	207.90	212.42	216.93	221.45	225.96	.452

Angle.	10	20	30	40	50	60	70	80	90	100	D
8° 0′	4.71	9.23	13.74	18.26	22.77	27.29	31.80	36.32	40.83	45.35	.452
1	4.72	9.24	13.77	18.29	22.82	27.34	31.87	36.39	40.92	45.44	.452
2	4.73	9.26	13.80	18.33	22.86	27.40	31.93	36.46	41.00	45.53	.453
3	4.74	9.28	13.82	18.37	22.91	27.45	31.99	36.54	41.08	45.62	.454
4	4.75	9.30	13.85	18.40	22.96	27.51	32.06	36.61	41.16	45.71	.455
5	4.76	9.32	13.88	18.44	23.00	27.56	32.12	36.68	41.25	45.81	.456
6	4.77	9.34	13.91	18.48	23.05	27.62	32.19	36.76	41.33	45.90	.457
7	4.78	9.36	13.94	18.51	23.09	27.67	32.25	36.83	41.41	45.99	.458
8	4.79	9.37	13.96	18.55	23.14	27.73	32.32	36.90	41.49	46.08	.459
9	4.80	9.39	13.99	18.59	23.19	27.78	32.38	36.98	41.57	46.17	.460
10	4.81	9.41	14.02	18.62	23.23	27.84	32.44	37.05	41.66	46.26	.461
11	4.81	9.43	14.05	18.66	23.28	27.89	32.51	37.12	41.74	46.36	.462
12	4.82	9.45	14.07	18.70	23.32	27.95	32.57	37.20	41.82	46.45	.462
13	4.83	9.47	14.10	18.74	23.37	28.00	32.64	37.27	41.90	46.54	.463
14	4.84	9.49	14.13	18.77	23.42	28.06	32.70	37.34	41.99	46.63	.464
15	4.85	9.51	14.16	18.81	23.46	28.11	32.77	37.42	42.07	46.72	.465
16	4.86	9.52	14.18	18.85	23.51	28.17	32.83	37.49	42.15	46.81	.466
17	4.87	9.54	14.21	18.88	23.55	28.22	32.89	37.56	42.23	46.90	.467
18	4.88	9.56	14.24	18.92	23.60	28.28	32.96	37.64	42.32	47.00	.468
19	4.89	9.58	14.27	18.96	23.65	28.33	33.02	37.71	42.40	47.09	.469
20	4.90	9.60	14.30	18.99	23.69	28.39	33.09	37.78	42.48	47.18	.470
21	4.91	9.62	14.32	19.03	23.74	28.44	33.15	37.86	42.56	47.27	.471
22	4.92	9.64	14.35	19.07	23.78	28.50	33.21	37.93	42.65	47.36	.472
23	4.93	9.65	14.38	19.10	23.83	28.55	33.28	38.00	42.73	47.45	.472
24	4.94	9.67	14.41	19.14	23.87	28.61	33.34	38.08	42.81	47.55	.473
25	4.95	9.69	14.43	19.18	23.92	28.66	33.41	38.15	42.89	47.64	.474
26	4.96	9.71	14.46	19.21	23.97	28.72	33.47	38.22	42.98	47.73	.475
27	4.97	9.73	14.49	19.25	24.01	28.77	33.54	38.30	43.06	47.82	.476
28	4.98	9.75	14.52	19.29	24.06	28.83	33.60	38.37	43.14	47.91	.477
29	4.99	9.77	14.55	19.33	24.10	28.88	33.66	38.44	43.22	48.00	.478
30	5.00	9.78	14.57	19.36	24.15	28.94	33.73	38.52	43.31	48.09	.479
31	5.01	9.80	14.60	19.40	24.20	28.99	33.79	38.59	43.39	48.19	.480
32	5.01	9.82	14.63	19.44	24.24	29.05	33.86	38.66	43.47	48.28	.481
33	5.02	9.81	14.66	19.47	24.29	29.10	33.92	38.74	43.55	48.37	.482
34	5.03	9.86	14.68	19.51	24.33	29.16	33 98	38.81	43.64	48.46	.483
35	5.04	9.88	14.71	19.55	24.38	29.21	34.05	38.88	43.72	48.55	.483
36	5.05	9.90	14.74	19.58	24.43	29.27	34.11	38.96	43.80	48.64	.484
37	5.06	9.91	14.77	19.62	24.47	29.32	34.18	39.03	43.88	48.74	.485
38	5.07	9.93	14.80	19.66	24.52	29.38	34.24	39.10	43.97	48.83	.486
39	5.08	9.95	14.82	19.69	24.56	29.44	34.31	39.18	44.05	48.92	.487
40	5.09	9.97	14.85	19.73	24.61	29.49	34.37	39.25	44.13	49.01	.488
41	5.10	9.99	14.88	19.77	24.66	29.55	34.43	39.33	44.21	49.10	.489
42	5.11	10.01	14.91	19.80	24.70	29.60	34.50	39.40	44.29	49.19	.490
43	5.12	10.03	14.93	19.84	24.75	29.66	34.56	39.47	44.38	49.28	.491
44	5.13	10.05	14.96	19.88	24.79	29.71	34.63	39.54	44.46	49.38	.492
45	5.14	10.06	14.99	19.92	24.84	29.77	34.69	39.62	44.54	49.47	.493
46	5.15	10.08	15.02	19.95	24.87	29.82	34.76	39.69	44.62	49.56	.493
47	5.16	10.10	15.04	19.99	24.93	29.88	34.82	39.76	44.71	49.65	.494
48	5.17	10.12	15.07	20.03	24.98	29.93	34.88	39.84	44.79	49.74	.495
49	5.18	10.14	15.10	20.06	25.02	29.99	34.95	39.91	44.87	49.83	.496
50	5.19	10.16	15.13	20.10	25.07	30.04	35.01	39.98	44.95	49.93	.497
51	5.20	10.18	15.16	20.14	25.12	30.10	35.08	40.06	45.04	50.02	.498
52	5.21	10.19	15.18	20.17	25.16	30.15	35.14	40.13	45.12	50.11	.499
53	5.21	10.21	15.21	20.21	25.21	30.21	35.20	40.20	45.20	50.20	.500
54	5.22	10.23	15.24	20.25	25.25	30.26	35.27	40.28	45.28	50.29	.501
55	5.23	10.25	15.27	20.28	25.30	30.32	35.33	40.35	45.37	50.38	.502
56	5.24	10.27	15.29	20.32	25.35	30.37	35.40	40.42	45.45	50.47	.503
57	5.25	10.29	15.32	20.36	25.39	30.43	35.46	40.50	45.53	50.57	.503
58	5.26	10.31	15.35	20.39	25.44	30.48	35.53	40.57	45.61	50.66	.504
59	5.27	10.32	15.38	20.43	25.48	30.54	35.59	40.64	45.70	50.75	.505
60	5.28	10.34	15.41	20.47	25.53	30.59	35.65	40.72	45.78	50.84	.506

Angle.	110	120	130	140	150	160	170	180	190	200	D
8° 0′	49.86	54.39	58.89	63.41	67.93	72.44	76.96	81.47	85.99	90.50	.452
1	49.96	54.49	59.01	63.54	68.06	72.59	77.11	81.64	86.16	90.68	.452
2	50.07	54.63	59.13	63.67	68.20	72.73	77.27	81.80	86.33	90.87	.453
3	50.17	54.71	59.25	63.79	68.34	72.88	77.42	81.96	86.51	91.05	.454
4	50.27	54 82	59.37	63.92	68.47	73.03	77.58	82.13	86.68	91.23	.455
5	50.37	54.93	59.49	64.05	68.61	73.17	77.73	82.29	86.85	91.42	.456
6	50.47	55.04	59.61	64.18	63.75	73.32	77.89	82.46	87.03	91.60	.457
7	50.57	55.15	59.73	64.31	68.89	73.46	78.04	82.62	87.20	91.79	.458
8	50.67	55.26	59.85	64.43	69.02	73.61	78.20	42.79	87.38	91.96	.459
9	50.77	55.37	59.96	64.56	69.16	73.76	78.35	82.95	87.55	92.15	.460
10	50.87	55.48	60.08	64.69	69.30	73.90	78.51	83.12	87.72	92.33	.461
11	50.97	55.59	60.20	64.82	69.43	74.05	78.66	83.28	87.90	92.51	.462
12	51.07	55.70	60.32	64.95	69.57	74.20	78.82	83.44	88.07	92.69	.462
13	51.17	55.81	60.44	65.07	69.71	74.34	78.98	83.61	88.24	92.88	.463
14	51.27	55.92	60.56	65.20	69.84	74.49	79.13	83.77	88.42	93.06	.464
15	51.37	56.03	60.68	65.33	69.98	74.63	79.29	83.94	88.59	93.24	.465
16	51.47	56.14	60.80	65.46	70.12	74.78	79.44	84.10	88.76	93.42	.466
17	51.57	56.25	60.92	65.59	70.26	74.93	79.60	84.27	88.94	93.61	.467
18	51.68	56.35	61.03	65.71	70.39	75.07	79.75	84.43	89.11	93.79	.468
19	51.78	56.46	61.15	65.84	70.53	75.22	79.91	84.60	89.28	93.97	.469
20	51.83	56.57	61.27	65.97	70.67	75.36	80.06	84.76	89.46	94.16	.470
21	51.98	56.68	61.39	66.10	70.80	75.51	80.22	84.92	89.63	94.34	.471
22	52.08	56.79	61.51	66.23	70.94	75.66	80.37	85.09	89.80	94.52	.472
23	52.18	56 90	61 63	66.35	71.08	75.80	80.53	85.25	89.98	94.70	.472
24	52.28	57.01	61.75	66.48	71.22	75.95	80.68	85.42	90.15	94.89	.473
25	52.38	57.12	61.87	66.61	71.35	76.10	80.84	85.58	90.33	95.07	.474
26	52.48	57.23	61.99	66.74	71.49	76.24	80.99	85.75	90.50	95.25	.475
27	52.58	57.34	62.10	66 87	71.63	76.39	81.15	85.91	90.67	95.43	.476
28	52.68	57.45	62.22	66.99	71.76	76.53	81.31	86.08	90.85	95.62	.477
29	52.78	57.56	62.34	67.12	71.90	76.68	81.46	86.24	91.02	95.80	.478
30	52.88	57.67	62.46	67.25	72.04	76.83	81.62	86.40	91.19	95.98	.479
31	52.98	57.78	62.58	67.38	72.18	76.97	81.77	86.57	91.37	96.16	.480
32	53.08	57.89	62.70	67.51	72.31	77.12	81.93	86 73.	91.54	96.35	.481
33	53.19	58.00	62 82	67.63	72.45	77.27	82.08	86.90	91.71	96.53	.482
34	53.29	58.11	62.94	67.76	72.59	77.41	82.24	87.06	91.89	96.71	.483
35	53.39	58.22	63.05	67.89	72.72	77.56	82.39	87.23	92.06	96.90	.483
36	53.49	58.33	63.17	68.02	72.86	77.70	82.55	87.39	92.23	97.08	.484
37	53.59	58.44	63.29	68.15	73.00	77.85	82.70	87.56	92.41	97.26	.485
38	53.69	58.55	63.41	68.27	73.14	78.00	82.86	87.72	92.58	97.44	.486
39	53.79	58.66	63.53	68.40	73.27	78.14	83.01	87.88	92.76	97.63	.487
40	53.89	58.77	63.65	68.53	73.41	78.29	83.17	88.05	92.93	97.81	.488
41	53.99	58.88	63.77	68.66	73.55	78.44	83.34	88.21	93.10	97.99	.489
42	54.09	58.99	63.89	68.79	73.68	78.58	83.48	88.38	93.28	98.17	.490
43	54.19	59.10	64.01	68.91	73.82	78.73	83.64	88.54	93.45	98.36	.491
44	54.29	59.21	64.12	69.04	73.96	78.87	83.79	88.71	93.62	98.54	.492
45	54.39	59.32	64.24	69.17	74.09	79.02	83.95	88.87	93.80	98.72	.493
46	54.49	59.43	64.36	69.30	74.23	79.17	84.10	89.04	93.97	98.90	.493
47	54.59	59.54	64.48	69.44	74.37	79.31	84.26	89.20	91.14	99.03	.494
48	54.70	59.65	64.60	69.55	74.51	79.46	84.41	89.36	94.31	99.27	.495
49	54.80	59.76	64.72	69.68	74.64	79.60	84.57	89.53	94.49	99.45	.496
50	54.90	59.87	64.84	69.81	74.78	79.75	84.72	89.69	94.66	99.64	.497
51	55.00	59 98	64.96	69.94	74.92	79.90	84.88	89.86	94.84	99.82	.498
52	55.10	60.09	65.08	70.07	75.05	80.04	85.03	90.02	95.01	100.00	.499
53	55.20	60.20	65.19	70.19	75.19	80.19	85.19	90.19	95.18	100.18	.500
54	55.30	60.31	65.31	70.32	75.33	80.34	85.34	90.35	95.36	100.37	.501
55	55.40	60.42	65.43	70.45	75.47	80.48	85.50	90.52	95.53	100.55	.502
56	55.50	60.53	65.55	70.58	75.60	80.63	85.65	90.68	95.71	100.73	.503
57	55.60	60.64	65.67	70.71	75.74	80.77	85.81	90.84	95.88	100.91	.503
58	55.70	60.75	65.79	70.83	75.88	80.92	85.97	91.01	96.05	101.10	.504
59	55.80	60.86	65.91	70.96	76.01	81.07	86.12	91.17	96.23	101.28	.505
60	55.90	60.97	66.03	71.09	76.15	81.21	86.28	91.34	96.40	101.46	.506

Angle.	210	220	230	240	250	260	270	280	290	300	D
8° 0′	95.02	99.53	104.05	108.56	113.08	117.59	122.11	126.62	131.14	135.66	.452
1	95.21	99.73	104.26	108.78	113.31	117.83	122.36	126.88	131.40	135.93	.452
2	95.40	99.93	104.47	109 00	113.54	118.07	122.60	127.14	131.67	136.20	.453
3	95.59	100.14	104.68	109.22	113.76	118.31	122.85	127.39	131.93	136.48	.454
4	95.78	100 34	104.89	109.44	113.99	118 54	123.10	127.65	132.20	136.75	.455
5	95.98	100.54	105.10	109.66	114.22	118.78	123.34	127.90	132.46	137.02	.456
6	96.17	100.74	105.31	109.88	114.45	119.02	123.59	128.16	132.73	137.30	.457
7	96.36	100.94	105.52	110.10	114.68	119.26	123.83	128.41	132.99	137.57	.458
8	96.55	101.14	105.73	110.32	114.90	119.49	124.08	128.67	133.26	137.85	.459
9	96.74	101.34	105.94	110.54	115.13	119.73	124.33	128.92	133.52	138.12	.460
10	96.94	101.54	106.15	110.76	115.36	119.97	124.57	129.18	133.79	138.39	.461
11	97.13	101.74	106.36	110.97	115.59	120.21	124.82	129.44	134.05	138.67	.462
12	97.32	101.94	106.57	111.20	115.82	120.44	125.07	129.69	134.32	138.94	.462
13	97.51	102.14	106.78	111.41	116.05	120.68	125.31	129.95	134.58	139.22	.463
14	97.70	102.35	106.99	111.63	116.27	120.92	125.56	130.20	134.85	139.49	.464
15	97.89	102.55	107.20	111.85	116.50	121.15	125.81	130.46	135.11	139.76	.465
16	98.09	102.75	107.41	112.07	116.73	121.39	126.05	130.71	135.38	140.04	.466
17	98.28	102.95	107.62	112.29	116.96	121.63	126.30	130.97	135.64	140.31	.467
18	98.47	103.15	107.83	112.51	117.19	121.87	126.55	131.22	135.90	140.58	.468
19	98.66	103.35	108.04	112.73	117.42	122.10	126.79	131.48	136.17	140.86	.469
20	98.85	103.55	108.25	112.95	117.64	122.34	127.04	131.74	136.43	141.13	.470
21	99.04	103.75	108.46	113.17	117.88	122.58	127.29	131.99	136.70	141.41	.471
22	99.24	103.95	108.67	113.38	118.10	122.82	227.53	132.25	136.96	141.68	.472
23	99.43	104.15	108.88	113.60	118.33	123.05	127.78	132.50	137.23	141.95	.472
24	99.62	104.35	109.09	113.82	118.56	123.29	128.02	132.76	137.49	142.23	.473
25	99.81	104.56	109.30	114.04	118.78	123.53	128.27	133.01	137.76	142.50	.474
26	100.00	104.76	109.51	114.26	119.01	123.77	128.52	133.27	138.02	142.77	.475
27	100.20	104.96	109.72	114.48	119.24	124.00	128.76	133.52	138.29	143.05	.476
28	100.39	105.16	109.93	114.70	119.47	124.24	129.01	133.78	138.55	143.32	.477
29	100.58	105.36	110.14	114.92	119.70	124.48	129.26	134.04	138.82	143.60	.478
30	100.77	105.56	110.35	115.14	119.93	124.71	129.50	134.29	139.08	143.87	.479
31	100.96	105.76	110.56	115.36	120.15	124.95	129.75	134.55	139.35	144.14	.480
32	101.15	105.96	110 77	115.58	120.38	125.19	130.00	134.80	139.61	144.42	.481
33	101.34	106.16	110.98	115.79	120.61	125.43	130.24	135.06	139.88	144.69	.482
34	101.54	106.36	111.19	116.01	120.84	125.66	130.49	135.31	140.14	144.97	.483
35	101.73	106.66	111.40	116.23	121.07	125.90	130.74	135.57	140.40	145.24	.483
36	101.92	106.77	111.61	116.45	121.30	126.14	130.98	135.82	140.67	145.51	.484
37	102.13	106.97	111.82	116.67	121.52	126.38	131.23	136.08	140.93	145.79	.485
38	102.31	107.17	112.03	116.89	121.75	126.61	131.48	136.34	141.20	146.06	.486
39	102.50	107.37	112.24	117.11	121.98	126.85	131.72	136.59	141.46	146.33	.487
40	102 69	107.57	112.45	117.33	122.21	127.09	131.97	136.85	141.73	146.61	.488
41	102.88	107.77	112.66	117.55	122.44	127.33	132.21	137.10	141.99	146.88	.489
42	103.07	107.97	112.87	117.77	222.66	127.56	132.46	137.36	142.26	147.16	.490
43	103.26	108.17	113.08	117.99	122.89	127.80	132.71	137.61	142.52	147.43	.491
44	103.46	108.37	113.29	118.20	123.12	128.04	132.95	137.87	142.79	147.70	.492
45	103.65	101.57	113.50	118.42	123.35	128.27	133.20	138.13	143.05	147.98	.493
46	103.84	108.7	113.71	118.64	123.58	128.51	33.45	138.38	143.32	148.25	.493
47	104.03	108.98	113.92	118.86	123.81	128.75	133.69	138.64	143.58	148.52	.494
48	104.22	109.18	114.13	119 03	124.03	128.99	133.94	138.89	143.85	148.80	.495
49	104.41	109.38	114.34	119.30	124.26	129.22	134.19	139.15	144.11	149.07	.496
50	104.61	109.58	114.55	119.52	124.49	129.46	134.43	139.40	144.37	149.35	.497
51	104.80	109.78	114.76	119.74	124.72	129.70	134.68	139.66	144.64	149.62	.498
52	104.99	109.98	114.97	119.96	124.95	129.94	134.93	139.91	144.90	149.89	.499
53	105.18	110.18	115.18	120.18	125.18	130.17	135.17	140.17	145.17	150.17	.500
54	105.37	110.38	115.39	120.40	125.40	130.41	135.42	140.43	145.43	150.44	.501
55	105.57	110.58	115.60	120.62	125.63	130.65	135.67	140.68	145.70	150.72	.502
56	105.76	110.78	115.81	120.83	125.86	130.89	135.91	140.94	145.96	150.99	.503
57	105.95	110.98	116.02	121.05	126.09	131.12	136.16	141.19	146.23	151.26	.503
58	106.14	111.19	116.23	121.27	126.32	131.36	136.40	141.45	146.49	151.54	.504
59	106.33	111.39	116.44	121.49	126.55	1 1.60	136.65	141.70	146.76	151.81	.505
60	106 52	111.59	116.65	121.71	126.77	131.84	136.90	141.96	147.02	152.08	.506

Angle.	310	320	330	340	350	360	370	380	390	400	D
8° 0′	140.17	144.69	149.20	153.72	158.23	162.75	167.26	171.78	176.29	180.81	.452
1	140.45	144.98	149.50	154.03	158.55	163.08	167.60	172.13	176.65	181.17	.452
2	140.74	145.27	149.80	154.34	158.87	163.40	167.94	172.47	177.01	181.54	.453
3	141.02	145.56	150.11	154.65	159.19	163.73	168.28	172.82	177.36	181.90	.454
4	141.30	145.85	150.41	154.96	159.51	164.06	168.61	173.17	177.72	182.27	.455
5	141.59	146.15	150.71	155.27	159.83	164.39	168.95	173.51	178.07	182.63	.456
6	141.87	146.44	151.01	155.58	160.15	164.72	169.29	173.86	178.43	183.00	.457
7	142.15	146.73	151.31	155.89	160.47	165.05	169.63	174.21	128.78	183.36	.458
8	142.43	147.02	151.61	156.20	160.79	165.38	169.96	174.55	179.14	183.73	.459
9	142.72	147.31	151.91	156.51	161.11	165.70	170.30	174.90	179.50	184.09	.460
10	143.00	147.61	152.21	156.82	161.43	166.03	170.64	175.25	179.85	184.46	.461
11	143.28	147.90	152.51	157.13	161.75	166.36	170.98	175.59	180.21	184.82	.462
12	113.57	148.19	152.82	157.44	162.06	166.69	171.31	175.94	180.56	185.19	.462
13	143.85	148.48	153.12	157.75	162.39	167.02	171.65	176.29	180.92	185.55	.463
14	144.13	148.77	153.42	158.06	162.70	167.35	171.99	176.63	181.28	185.92	.464
15	144.41	149.07	153.72	158.37	163.02	167.68	172.33	176.98	181.63	186.28	.465
16	144.70	149.36	154.02	158.68	163.34	168.00	172.66	177.33	181.99	186.65	.466
17	144.98	149.65	154.32	158.99	163.66	168.33	173.00	177.67	182.34	187.01	.467
18	145.26	149.94	154.62	159.30	163.98	168.66	173.34	178.02	182.70	187.38	.468
19	145.55	150.23	154.92	159.61	164.30	168.99	173.68	178.37	183.05	187.74	.469
20	145.83	150.53	155.22	159 92	164.62	169.32	174.02	178.71	183.41	188.11	.470
21	146.11	150.82	155.53	160.23	164.94	169.65	174.35	179.06	183.77	188.47	.471
22	146.40	151.11	155.83	160.54	165.26	169.97	174.69	179.41	184.12	188.84	.472
23	146.68	151.40	156.13	160.85	165.58	170.30	175.03	179.75	184.48	189.20	.472
24	146.96	151.70	156.43	161.16	165.90	170.63	175.37	180.10	184.83	189.57	.473
25	147.24	151.99	156.73	161.47	166.22	170.96	175.70	180.45	185.19	189.93	.474
26	147.53	152.28	157.03	161.78	166.54	171.29	176.04	180.79	185.55	190.30	.475
27	147.81	152.57	157.33	192.09	166.86	171.62	176.38	181.14	185.90	190.66	.476
28	148.09	152.86	157.63	162.40	167.17	171.95	176.72	181.49	186.26	191.03	.477
29	148.38	153.16	157.94	162.71	167.49	172.27	177.05	181.83	186.61	191.39	.478
30	148.66	153.45	158.24	163.02	167.81	172.60	177.39	182.18	186.97	191.76	.479
31	148.94	153.74	158.54	163.34	168.13	172.93	177.73	182.53	187.32	192.12	.480
32	149.22	154.03	158.84	163.65	168.45	173.26	178.07	182.87	187.68	192.49	.481
33	149.51	154.32	159.14	163.96	168.77	173.59	178.40	183.22	188.04	192.85	.482
34	149.79	154.62	159.44	164.27	169.09	173.92	178.74	183.57	188.39	193.22	.483
35	150.07	154.91	159.74	164.58	169.41	174.24	179.08	183.91	188.75	193.58	.483
36	150.36	155.20	160.04	164.89	169.73	174.57	179.42	184.26	189.10	193.95	.484
37	150.64	155.49	160.34	165.20	170.05	174.90	179.75	184.61	189.46	194.31	.485
38	150.92	155.78	160.65	165.51	170.37	175.23	180.09	184.95	189.82	194.68	.486
39	151.20	156.08	160.95	165.82	170.69	175.56	180.43	185.30	190.17	195.04	.487
40	151.49	156.37	161.25	166.13	171.01	175.89	180.77	185.65	190.53	195.41	.488
41	151.77	156.66	161.55	166.44	171.33	176.22	181.10	185.99	190.88	195.77	.489
42	152.05	156.95	161.85	166.75	171.65	176.54	181.44	186.34	191.24	196.14	.490
43	152.34	157.24	162.15	167.06	171.97	176.87	181.78	186.69	191.59	196.50	.491
44	152.62	157.54	162.45	167.37	172.28	177.20	182.12	187 03	191.95	196.87	.492
45	152.90	157.83	162.75	167.68	172.60	177.53	182.46	187.38	192.31	197.23	.493
46	153.19	158.12	163.05	167.99	172.92	177.86	182.79	187.73	192.66	197.60	.493
47	153.47	158.41	163.36	168.30	173.24	178.19	183.13	188.07	193.c2	197.96	.494
48	153.75	158.70	163.66	168.61	173.56	178.52	183.47	188.42	193.38	198.33	.495
49	154.03	159.00	163.96	168.92	173.88	178.84	183.81	188.77	193.73	198.69	.496
50	154.32	159.29	164.26	169.23	174.20	179.17	184.14	189.11	194.09	199.06	.497
51	154.60	159.58	164.56	169.54	174.52	179.50	184.48	189.46	194.44	199.42	.498
52	154.88	159.87	164.86	1c9.85	174.84	179.83	184.82	189.80	194.80	199.79	.499
53	155.17	160.16	165.16	170.16	175.16	180.16	185.16	190.15	195.15	200.15	.500
54	155.45	160.46	165.46	170.47	175.48	180.49	185.49	190.50	195.51	200.52	.501
55	155.73	160.75	165.76	170.78	175.80	180.81	185.83	190.85	195.86	200.88	.502
56	156.01	161.04	166.07	171.09	176.12	181.14	186.17	191.19	196.22	201.25	.403
57	156.30	161.33	166.37	171.40	176.44	181.47	186.51	191.54	196.58	201.61	.503
58	156.58	161.62	166.67	171.71	176.76	181.80	186.84	191.89	196.93	201.98	.504
59	156.86	161.92	166.97	172.02	177.08	182.13	187.18	192.23	197.29	202.34	.505
60	157.15	162.21	167.27	172.33	177.40	182.46	187.52	192.58	197.64	202.71	.506

Angle.	10	20	30	40	50	60	70	80	90	100	D
9° 0′	5.28	10.34	15.41	20.47	25.53	30.59	35.65	40.72	45.78	50.84	.506
1	5.29	10.36	15.43	20.50	25.58	30.65	35.72	40.79	45.86	50.93	.507
2	5.30	10.38	15.46	20.54	25.62	30.70	35.78	40.86	45.94	51.02	.508
3	5.31	10.40	15.49	20.58	25.67	30.76	35.84	40.93	46.02	51.11	.509
4	5.32	10.42	15.52	20.61	25.71	30.81	35.91	41.01	46.10	51.20	.510
5	5.33	10.44	15.54	20 65	25.76	30.86	35.97	41.08	46.19	51.29	.511
6	5.34	10.45	15.57	20.69	25.80	30.92	36.04	41.15	46.27	51.38	.512
7	5.35	10.47	15.60	20.72	25.85	30.97	36.10	41.22	46.35	51.47	.513
8	5.36	10.49	15.62	20.76	25.89	31.03	36.16	41.30	46.43	51.56	.513
9	5.37	10.51	15.65	20.80	25.94	31.08	36.23	41.37	46.51	51.66	.514
10	5.38	10.53	15.68	20.83	25.98	31.14	36.29	41.44	46.59	51.75	.515
11	5.38	10.55	15.71	20.87	26.03	31.19	36.35	41.51	46.68	51.84	.516
12	5.39	10.56	15.73	20.90	26.08	31.25	36.42	41.59	46.76	51.93	.517
13	5.40	10.58	15.76	20.94	26.12	31.30	36.48	41.66	46.84	52.02	.518
14	5.41	10.60	15.79	20.98	26.17	31.35	36.54	41.73	46.92	52.11	.519
15	5.42	10.62	15.82	21.01	26.21	31.41	36.61	41.80	47.00	52.20	.520
16	5.43	10.64	15.84	21.03	26.26	31.46	36.67	41.88	47.08	52.29	.521
17	5.44	10.66	15.87	21.09	26.30	31.52	36.73	41.95	47.16	52.38	.522
18	5.45	10.67	15.90	21.12	26.35	31.57	36.80	42.02	47.25	52.47	.523
19	5.46	10.69	15.93	21.16	26.39	31.63	36.86	42.09	47.33	52.56	.523
20	5.47	10.71	15.95	21.20	26.44	31.68	36.92	42.17	47.41	52.65	.524
21	5.48	10.73	15.98	21.23	26.48	31.74	36.99	42.24	47.49	52.74	.525
22	5.49	10.75	16.01	21.27	26.53	31.79	37.05	42.31	47.57	52.83	.526
23	5.50	10.77	16.04	21.31	26.58	31.84	37.11	42.38	47.65	52.92	.527
24	5.51	10.79	16.06	21.34	26.62	31.90	37.18	42.46	47.73	53.01	.528
25	5.52	10.80	16.09	21.38	26.67	31.95	37.24	42.53	47.82	53.10	.529
26	5.53	10.82	16.12	21.42	26.71	32.01	37.30	42.60	47.90	53.19	.530
27	5.54	10.84	16.15	21.45	26.76	32.06	37.37	42.67	47.98	53.28	.531
28	5.55	10.86	16.17	21.49	26.80	32.12	37.43	42.75	48.06	53.37	.532
29	5.55	10.88	16.20	21.52	26.85	32.17	37.50	42.82	48.14	53.47	.533
30	5.56	10.90	16.23	21.56	26.89	32.23	37.56	42.89	48.22	53.56	.533
31	5.57	10.91	16.26	21.60	26.94	32.28	37.62	42.96	48.31	53.65	.534
32	5.58	10.93	16.28	21.63	26.98	32.34	37.69	43.04	48.39	53.74	.535
33	5.59	10.95	16.31	21.67	27.03	32.39	37.75	43.11	48.47	53.83	.536
34	5.60	10.97	16.34	21.71	27.08	32.44	37.81	43.18	48.55	53.92	.537
35	5.61	10.99	16.37	21.74	27.12	32.50	37.88	43.25	48.63	54.01	.538
36	5.62	11.01	16.39	21.78	27.17	32.55	37.94	43.33	48.71	54.10	.539
37	5.63	11.02	16.42	21.81	27.21	32.61	38.00	43.40	48.79	54.19	.540
38	5.64	11.04	16.45	21.85	27.26	32.66	38.07	43.47	48.88	54.28	.541
39	5.65	11.06	16.48	21.89	27.30	32.72	38.13	43.54	48.96	54.37	.542
40	5.66	11.08	16.50	21.93	27.35	32.77	38.19	43.62	49.04	54.46	.543
41	5.67	11.10	16.53	21.96	27.39	32.83	38.26	43.69	49.12	54.55	.543
42	5.68	11.12	16.56	22.00	27.44	32.88	38.32	43.76	49.20	54.64	.544
43	5.69	11.14	16.58	22.03	27.48	32.93	38.38	43.83	49.28	54.73	.545
44	5.70	11.15	16.61	22.07	27.53	32.99	38.45	43.91	49.36	54.82	.546
45	5.70	11.17	16.64	22.11	27.58	33.04	38.51	43.98	49.45	54.91	.547
46	5.71	11.19	16.67	22.14	27.62	33.10	38.57	44.05	49.53	55.00	.548
47	5.72	11.21	16.69	22.18	27.67	33.15	38.64	44.12	49.61	55.09	.549
48	5.73	11.23	16.72	22.22	27.71	33.21	38.70	44.20	49.69	55.19	.550
49	5.74	11.25	16.75	22.25	27.76	33.26	38.76	44.27	49.77	55.28	.551
50	5.75	11.26	16.78	22.29	27.80	33.32	38.83	44.34	49.85	55.37	.552
51	5.76	11.28	16.80	22.33	27.85	33.37	38.89	44.41	49.94	55.46	.553
52	5.77	11.30	16.83	22.36	27.89	33.42	38.96	44.49	50.02	55.55	.553
53	5.78	11.32	16.86	22.40	27.94	33.48	39.02	44.56	50.10	55.64	.554
54	5.79	11.34	16.89	22.44	27.98	33.53	39.08	44.63	50.18	55.73	.555
55	5.80	11.36	16.91	22.47	28.03	33.59	39.15	44.70	50.26	55.82	.556
56	5.81	11.37	16.94	22.51	28.08	33.64	39.21	44.78	50.34	55.91	.557
57	5.82	11.39	16.97	22.54	28.12	33.70	39.27	44.85	50.42	56.00	.557
58	5.83	11.41	17.00	22.58	28.17	33.75	39.34	44.92	50.51	56.09	.558
59	5.84	11.43	17.02	22.62	28.21	33.81	39.40	44.99	50.59	56.18	.559
60	5.85	11.45	17.05	22.65	28.26	33.86	39.46	45.07	50.67	56.27	.560

Angle.	110	120	130	140	150	160	170	180	190	200	D
9° 0′	55.92	60.97	66.03	71.09	76.15	81.21	86.28	91.34	96.40	101.46	.506
1	56.00	61.07	66.14	71.22	76.29	81.36	86.43	91.50	96.57	101.64	.507
2	56.10	61.18	66.26	71.34	76.42	81.50	86.58	91.66	96.74	101.82	.508
3	56.20	61.29	66.38	71.47	76.56	81.65	86.74	91.83	96.92	102.00	.509
4	56.30	61.40	66.50	71.60	76.69	81.79	86.89	91.99	97.09	102.18	.510
5	56.40	61.51	66.61	71.72	76.83	81.94	87.04	92.15	97.26	102.37	.511
6	56.50	61.62	66.73	71.85	76.96	82.08	87.20	92.31	97.43	102.55	.512
7	56.60	61.72	66.85	71.98	77.10	82.24	87.35	92.48	97.60	102.73	.513
8	56.70	61.83	66.97	72.10	77.24	82.37	87.50	92.64	97.77	102.91	.513
9	56.80	61.94	67.09	72.23	77.37	82.51	87.66	92.80	97.94	103.09	.514
10	56.90	62.05	67.20	72.35	77.51	82.66	87.81	92.96	98.12	103.27	.515
11	57.00	62.16	67.32	72.48	77.64	82.80	87.97	93.13	98.29	103.45	.516
12	57.10	62.27	67.44	72.61	77.78	82.95	88.12	93.29	98.46	103.63	.517
13	57.20	62.38	67.56	72.73	77.91	83.09	88.27	93.45	98.63	103.81	.518
14	57.30	62.48	67.67	72.86	78.05	83.24	88.43	93.61	98.80	103.99	.519
15	57.40	62.59	67.79	72.99	78.18	83.38	88.58	93.78	98.97	104.17	.520
16	57.50	62.70	67.91	73.11	78.32	83.53	88.73	93.94	99.15	104.35	.521
17	57.59	62.81	68.03	73.24	78.46	83.67	88.89	94.10	99.32	104.53	.522
18	57.69	62.92	68.14	73.37	78.59	83.82	89.04	94.26	99.49	104.71	.523
19	57.79	63.03	68.26	73.49	78.73	83.96	89.19	94.43	99.66	104.89	.523
20	57.89	63.14	68.38	73.62	78.86	84.11	89.35	94.59	99.83	105.07	.524
21	57.99	63.24	68.50	73.75	79.00	84.25	89.50	94.75	100.00	105.26	.525
22	58.09	63.35	68.61	73.87	79.13	84.39	89.65	94.91	100.18	105.44	.526
23	58.19	63.46	68.73	74.00	79.27	84.54	89.81	95.08	100.35	105.62	.527
24	58.29	63.57	68.85	74.13	79.40	84.68	89.96	95.24	100.52	105.80	.528
25	58.39	63.68	68.97	74.25	79.54	84.83	90.12	95.40	100.69	105.98	.529
26	58.49	63.79	69.08	74.38	79.68	84.97	90.27	95.57	100.86	106.16	.530
27	58.59	63.90	69.20	74.51	79.81	85.12	90.42	95.73	101.03	106.34	.531
28	58.69	64.00	69.32	74.63	79.95	85.26	90.58	95.89	101.21	106.52	.532
29	58.79	64.11	69.44	74.76	80.08	85.41	90.73	96.05	101.38	106.70	.533
30	58.89	64.22	69.55	74.89	80.22	85.55	90.88	96.22	101.55	106.88	.533
31	58.99	64.33	69.67	75.01	80.35	85.70	91.04	96.38	101.72	107.06	.534
32	59.09	64.44	69.79	75.14	80.49	85.84	91.19	96.54	101.89	107.24	.535
33	59.19	64.55	69.91	75.27	80.62	85.98	91.34	96.70	102.06	107.42	.536
34	59.29	64.66	70.02	75.39	80.76	86.13	91.50	96.87	102.23	107.60	.537
35	59.39	64.76	70.14	75.52	80.90	86.27	91.65	97.03	102.41	107.78	.538
36	59.49	64.87	70.26	75.65	81.03	86.42	91.80	97.19	102.58	107.96	.539
37	59.59	64.98	70.38	75.77	81.17	86.56	91.96	97.35	102.75	108.15	.540
38	59.68	65.09	70.49	75.90	81.30	86.71	92.11	97.52	102.92	108.33	.541
39	59.78	65.20	70.61	76.02	81.44	86.85	92.27	97.68	103.09	108.51	.542
40	59.88	65.31	70.73	76.15	81.57	87.00	92.42	97.84	103.26	108.69	.543
41	59.98	65.41	70.85	76.28	81.71	87.14	92.57	98.00	103.44	108.87	.543
42	60.08	65.52	70.96	76.40	81.85	87.29	92.73	98.17	103.61	109.05	.544
43	60.18	65.63	71.08	76.53	81.98	87.43	92.88	98.33	103.78	109.23	.545
44	60.28	65.74	71.20	76.66	82.12	87.57	93.03	98.49	103.95	109.41	.546
45	60.38	65.85	71.32	76.78	82.25	87.72	93.19	98.65	104.12	109.59	.547
46	60.48	65.96	71.43	76.91	82.39	87.86	93.34	98.82	104.2	109.77	.548
47	60.58	66.07	71.55	77.04	82.52	88.01	93.49	98.98	104.47	109.95	.549
48	60.68	66.17	71.67	77.16	82.66	88.15	93.65	99.14	104.64	110.13	.550
49	60.78	66.28	71.79	77.29	82.79	88.30	93.80	99.30	104.81	110.31	.551
50	60.88	66.39	71.90	77.42	82.93	88.44	93.95	99.47	104.98	110.49	.552
51	60.98	66.50	72.02	77.54	83.07	88.59	94.11	99.63	105.15	110.67	.553
52	61.08	66.61	72.14	77.67	83.20	88.73	94.26	99.79	105.32	110.85	.553
53	61.18	66.72	72.26	77.80	83.34	88.88	94.42	99.96	105.50	111.03	.554
54	61.28	66.83	72.37	77.92	83.47	89.02	94.57	100.12	105.67	111.22	.555
55	61.38	66.93	72.49	78.05	83.61	89.17	94.72	100.28	105.84	111.40	.556
56	61.48	67.04	72.61	78.18	83.74	89.31	94.88	100.44	106.01	111.58	.557
57	61.58	67.15	72.73	78.30	83.88	89.45	95.03	100.61	106.18	111.76	.557
58	61.67	67.26	72.84	78.43	84.01	89.60	95.18	100.77	106.35	111.94	.558
59	61.77	67.37	72.96	78.56	84.15	89.74	95.34	100.93	106.52	112.12	.559
60	61.87	67.48	73.08	78.68	84.29	89.89	95.49	101.09	106.70	112.30	.560

Angle.	210	220	230	240	250	260	270	280	290	300	D
9° 0′	106.52	111.59	116.65	121.71	126.77	131.84	136.90	141.96	147.02	152.08	.506
1	106.71	111.79	116.86	121.93	127.00	132.07	137.14	142.21	147.28	152.35	.507
2	106.90	111.98	117.06	122.14	127.22	132.30	137.38	142.47	147.55	152.63	.508
3	107.09	112.18	117.27	122.36	127.45	132.54	137.63	142.72	147.81	152.90	.509
4	107.28	112.38	117.48	122.58	127.68	132.77	137.87	142.97	148.07	153.17	.510
5	107.47	112.58	117.69	122.79	127.90	133.01	138.12	143.22	148.33	153.44	.511
6	107.66	112.78	117.89	123.01	128.13	133.24	138.36	143.48	148.59	153.71	.512
7	107.85	112.98	118.10	123.23	128.35	133.48	138.60	143.73	148.85	153.98	.513
8	108.04	113.18	118.31	123.44	128.58	133.71	138.85	143.98	149.12	154.25	.513
9	108.23	113.37	118.52	123.66	128.80	133.95	139.09	144.23	149.38	154.52	.514
10	108.42	113.57	118.73	123.88	129.03	134.18	139.33	144.49	149.64	154.79	.515
11	108.61	113.77	118.93	124.09	129.26	134.42	139.58	144.74	149.90	155.06	.516
12	108.80	113.97	119.14	124.31	129.48	134.65	139.82	144.99	150.16	155.33	.517
13	108.99	114.17	119.35	124.53	129.71	134.89	140.07	145.24	150.42	155.60	.518
14	109.18	114.37	119.56	124.74	129.93	135.12	140.31	145.50	150.69	155.87	.519
15	109.37	114.57	119.76	124.96	130.16	135.36	140.55	145.75	150.95	156.15	.520
16	109.56	114.77	119.97	125.18	130.38	135.59	140.80	146.00	151.21	156.42	.521
17	109.75	114.96	120.18	125.39	130.61	135.83	141.04	146.26	151.47	156.69	.522
18	109.94	115.16	120.39	125.61	130.84	136.06	141.28	146.51	151.73	156.96	.523
19	110.13	115.36	120.59	125.83	131.06	136.29	141.53	146.76	151.99	157.23	.523
20	110.32	115.56	120.80	126.04	131.29	136.53	141.77	147.01	152.26	157.50	.524
21	110.51	115.76	121.01	126.26	131.51	136.76	142.02	147.27	152.52	157.77	.525
22	110.70	115.96	121.22	126.48	131.74	137.00	142.26	147.52	152.78	158.04	.526
23	110.89	116.16	121.42	126.69	131.96	137.23	142.50	147.77	153.04	158.31	.527
24	111.08	116.35	121.63	126.91	132.19	137.47	142.75	148.02	153.30	158.58	.528
25	111.27	116.55	121.84	127.13	132.42	137.70	142.99	148.28	153.56	158.85	.529
26	111.45	116.75	122.05	127.34	132.64	137.94	143.23	148.53	153.83	159.12	.530
27	111.64	116.95	122.26	127.56	132.87	138.17	143.48	148.78	154.09	159.37	.531
28	111.83	117.15	122.46	127.78	133.09	138.41	143.72	149.04	154.35	159.66	.532
29	112.02	117.35	122.67	127.99	133.32	138.64	143.96	149.29	154.61	159.94	.533
30	112.21	117.55	122.88	128.21	133.54	138.88	144.21	149.54	154.87	160.21	.533
31	112.40	117.74	123.09	128.43	133.77	139.11	144.45	149.79	155.14	160.48	.534
32	112.59	117.94	123.29	128.64	133.99	139.35	144.70	150.05	155.40	160.75	.535
33	112.78	118.14	123.50	128.86	134.22	139.58	144.94	150.30	155.66	161.02	.536
34	112.97	118.34	123.71	129.08	134.45	139.81	145.18	150.55	155.92	161.29	.537
35	113.16	118.54	123.92	129.29	134.67	140.05	145.43	150.80	156.18	161.56	.538
36	113.35	118.74	124.12	129.51	134.90	140.28	145.67	151.06	156.44	161.83	.539
37	113.54	118.94	124.33	129.73	135.12	140.52	145.91	151.31	156.71	162.10	.540
38	113.73	119.14	124.54	129.91	135.35	140.75	146.16	151.56	156.97	162.37	.541
39	113.92	119.33	124.75	130.16	135.57	140.99	146.40	151.82	157.23	162.64	.542
40	114.11	119.53	124.96	130.38	135.80	141.22	146.65	152.07	157.49	162.91	.543
41	114.30	119.73	125.16	130.59	136.03	141.46	146.89	152.32	157.75	163.18	.543
42	114.49	119.93	125.37	130.81	136.25	141.69	147.13	152.57	158.01	163.45	.544
43	114.68	120.13	125.58	131.03	136.48	141.93	147.38	152.83	158.28	163.73	.545
44	114.87	120.33	125.79	131.24	136.70	142.16	147.62	153.08	158.54	164.00	.546
45	115.06	120.53	125.99	131.46	136.93	142.40	147.86	153.33	158.80	164.27	.547
46	115.25	120.72	126.20	131.68	137.15	142.63	148.11	153.58	159.06	164.54	.548
47	115.44	120.92	126.41	131.89	137.38	142.87	148.35	153.84	159.32	164.81	.549
48	115.63	121.12	126.62	132.11	137.61	143.10	148.59	154.09	159.58	165.08	.550
49	115.82	121.32	126.82	132.33	137.83	143.33	148.84	154.34	159.85	165.35	.551
50	116.01	121.52	127.03	132.54	138.06	143.57	149.08	154.59	160.11	165.62	.552
51	116.20	121.72	127.24	132.76	138.28	143.80	149.33	154.85	160.37	165.89	.553
52	116.39	121.92	127.45	132.98	138.51	144.04	149.57	155.10	160.63	166.17	.553
53	116.57	122.11	127.65	133.19	138.73	144.27	149.81	155.35	160.89	166.43	.554
54	116.76	122.31	127.86	133.41	138.96	144.51	150.06	155.61	161.15	166.70	.555
55	116.95	122.51	128.07	133.63	139.19	144.74	150.30	155.86	161.42	166.97	.556
56	117.14	122.71	128.28	133.84	139.41	144.98	150.54	156.11	161.68	167.24	.557
57	117.33	122.91	128.49	134.06	139.64	145.21	150.79	156.36	161.94	167.52	.557
58	117.52	123.11	128.69	134.28	139.86	145.45	151.03	156.62	162.20	167.79	.558
59	117.71	123.31	128.90	134.49	140.09	145.68	151.28	156.87	162.46	168.06	.559
60	117.90	123.51	129.11	134.71	140.31	145.92	151.52	157.12	162.72	168.33	.560

Angle.	310	320	330	340	350	360	370	380	390	400	D
9° 0′	157.15	162.21	167.27	172.33	177.40	182.46	187.52	192.58	197.64	202.71	.506
1	157.43	162.50	167.57	172.64	177.71	182.78	187.85	192.92	198.00	203.07	.507
2	157.71	162.79	167.87	172.95	178.03	183.11	188.19	193.27	198.35	203.43	.508
3	157.99	163.07	168.16	173.25	178.34	183.43	188.52	193.61	198.70	203.79	.509
4	158.27	163.36	168.46	173.56	178.67	183.76	188.85	193.95	199.05	204.15	.510
5	158.54	163.65	168.76	173.87	178.97	184.08	189.19	194.30	199.40	204.51	.511
6	158.82	163.94	169.06	174.17	179.30	184.41	189.52	194.64	199.75	204.87	.512
7	159.10	164.23	169.35	174.48	179.61	184.73	189.86	194.98	200.11	205.23	.513
8	159.38	164.52	169.65	174.79	179.92	185.06	190.19	195.32	200.46	205.59	.513
9	159.66	164.81	169.95	175.09	180.24	185.38	190.52	195.67	200.81	205.95	.514
10	159.94	165.10	170.25	175.40	180.55	185.71	190.86	196.01	201.16	206.31	.515
11	160.22	165.38	170.55	175.71	180.87	186.03	191.19	196.35	201.51	206.68	.516
12	160.50	165.67	170.84	176.01	181.18	186.35	191.52	196.70	201.87	207.04	.517
13	160.78	165.96	171.14	176.32	181.50	186.68	191.86	197.04	202.22	207.40	.518
14	161.06	166.25	171.44	176.63	181.82	187.00	192.19	197.38	202.57	207.76	.519
15	161.34	166.54	171.74	176.93	182.13	187.33	192.53	197.72	202.92	208.12	.520
16	161.62	166.83	172.03	177.24	182.45	187.65	192.86	198.07	203.27	208.48	.521
17	161.90	167.12	172.33	177.55	182.76	187.98	193.19	198.41	203.62	208.84	.522
18	162.18	167.41	172.63	178.85	183.08	188.30	193.53	198.75	203.98	209.20	.523
19	162.46	167.69	172.93	178.16	183.39	188.63	193.86	199.09	204.33	209.56	.523
20	162.74	167.98	173.23	178.47	183.71	188.95	194.20	199.44	204.68	209.92	.524
21	163.02	168.27	173.52	178.77	184.03	189.28	194.53	199.78	205.03	210.28	.525
22	163.30	168.56	173.82	179.08	184.34	189.60	194.86	200.12	205.38	210.64	.526
23	163.58	168.85	174.12	179.39	184.66	189.93	195.20	200.47	205.74	211.00	.527
24	163.86	169.14	174.42	179.70	184.97	190.25	195.53	200.81	206.09	211.37	.528
25	164.14	169.43	174.71	180.00	185.29	190.58	195.86	201.15	206.44	211.73	.529
26	164.42	169.72	175.01	180.31	185.61	190.90	196.20	201.49	206.79	212.09	.530
27	164.70	170.00	175.31	180.62	185.92	191.23	196.53	201.84	207.14	212.45	.531
28	164.98	170.29	175.61	180.92	186.24	191.55	196.87	202.18	207.49	212.81	.532
29	165.26	170.58	175.91	181.23	186.55	191.88	197.20	202.52	207.85	213.17	.533
30	165.54	170.87	176.20	181.54	186.87	192.20	197.53	202.87	208.20	213.52	.533
31	165.82	171.16	176.50	181.84	187.18	192.53	197.87	203.21	208.55	213.89	.534
32	166.10	171.45	176.80	182.15	187.50	192.85	198.20	203.55	208.90	214.25	.535
33	166.38	171.74	177.10	182.46	187.82	193.18	198.53	203.89	209.25	214.61	.536
34	166.66	172.03	177.39	182.76	188.13	193.50	198.87	204.24	209.61	214.97	.537
35	166.94	172.31	177.69	183.07	188.45	193.82	199.20	204.58	209.96	215.33	.538
36	167.22	172.60	177.99	183.38	188.76	194.15	199.54	204.92	210.31	215 70	.539
37	167.50	172.89	178.29	183.68	189.08	194.47	199.87	205.27	210.66	216.06	.540
38	167.78	173.18	178.59	183.99	189.39	194.80	200.20	205.61	211.01	216.42	.541
39	168.06	173.47	178.88	184.30	189.71	195.12	200.54	205.95	211.36	216.78	.542
40	168.34	173.76	179.18	184.60	190.03	195.45	200.87	206.29	211.72	217.14	.543
41	168.62	174.05	179.48	184.91	190.34	195.77	201.21	206.64	212.07	217.50	.543
42	168.89	174.34	179.78	185.22	190.66	196.10	201.54	206.98	212.42	217.86	.544
43	169.17	174.62	180.07	185.52	190.97	196.42	201.87	207.32	212.77	218.22	.545
44	169.45	174.91	180.37	185.83	191.29	196.75	202.21	207.67	213.12	218.58	.546
45	169.7	175.20	180.67	186.14	191.61	197.07	202.54	208.01	213.48	218.94	.547
46	170.01	175.49	180.98	186.44	191.92	197.40	202.87	208.35	213.83	219.30	.548
47	170.29	175.78	181.26	186.75	192.24	197.72	203.21	208.69	214.18	219.66	.549
48	170.57	176.07	181.56	187.06	192.55	198.05	203.54	209.04	214.53	220.03	.550
49	170.85	176.3	181.86	187.36	192.87	198.37	203.88	209.38	214.88	220.39	.551
50	171.13	176.65	182.16	187.67	193.18	198.70	204.21	209.72	215.23	220.75	.552
51	171.41	176.93	182.46	187.98	193.50	199.02	204.54	210.06	215.59	221.11	.553
52	171.69	177.22	182.75	188.28	193.82	199.35	204.88	210.41	215 94	221.47	.553
53	171.97	177.51	183.05	188.59	194.13	199.67	205.21	210.75	216.29	221.83	.554
54	172.25	177.80	183.35	188.90	194.45	200.00	205.54	211.09	216.64	222.19	.555
55	172.53	178.09	183.65	189.21	194.76	200.32	205.88	211.44	216.99	222.55	.556
56	172.81	178.38	183.94	189.51	195.08	200.65	206.21	211.78	217.35	222.91	.557
57	173.09	178.67	184.24	189.82	195.39	200.97	206.55	212.12	217.70	223.27	.557
58	173.37	178.96	184.54	190.13	195.71	201.30	206.88	212.46	218.05	223.63	.558
59	173.65	179.24	184.84	190.43	196.03	201.62	207.21	212.81	218.40	223.99	.559
60	173.93	179.53	185.14	190.74	196.34	201.94	207.55	213.15	218.75	224.36	.560

TABLE II.—*To determine elevation for any distance.*

Angle.	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°
0′	.0000	.0572	.1143	.1712	.2280	.2845	.3406	.3963	.4515	.5062
1	.0010	.0581	.1152	.1722	.2289	.2854	.3415	.3972	.4525	.5071
2	.0019	.0591	.1162	.1731	.2299	.2863	.3424	.3982	.4534	.5080
3	.0029	.0600	.1171	.1741	.2308	.2873	.3434	.3991	.4543	.5089
4	.0038	.0610	.1181	.1750	.2318	.2882	.3443	.4000	.4552	.5098
5	.0048	.0619	.1190	.1760	.2327	.2891	.3452	.4009	.4561	.5107
6	.0057	.0629	.1200	.1769	.2336	.2901	.3462	.4018	.4570	.5116
7	.0067	.0638	.1209	.1779	.2346	.2910	.3471	.4028	.4579	.5125
8	.0076	.0648	.1219	.1788	.2355	.2919	.3480	.4037	.4588	.5134
9	.0086	.0657	.1228	.1798	.2365	.2929	.3489	.4046	.4597	.5143
10	.0095	.0667	.1238	.1807	.2374	.2938	.3499	.4055	.4607	.5152
11	.0105	.0676	.1247	.1816	.2383	.2948	.3508	.4064	.4616	.5161
12	.0114	.0686	.1257	.1826	.2393	.2957	.3517	.4074	.4625	.5170
13	.0124	.0695	.1266	.1835	.2402	.2966	.3527	.4083	.4634	.5179
14	.0133	.0705	.1276	.1845	.2412	.2976	.3536	.4092	.4643	.5188
15	.0143	.0714	.1285	.1854	.2421	.2985	.3545	.4101	.4652	.5197
16	.0152	.0724	.1295	.1864	.2430	.2994	.3554	.4110	.4661	.5206
17	.0162	.0733	.1304	.1873	.2440	.3004	.3564	.4120	.4670	.5215
18	.0172	.0743	.1314	.1883	.2449	.3013	.3573	.4129	.4679	.5224
19	.0181	.0753	.1323	.1892	.2459	.3022	.3582	.4138	.4689	.5233
20	.0191	.0762	.1333	.1902	.2468	.3032	.3592	.4147	.4698	.5242
21	.0200	.0772	.1343	.1911	.2478	.3041	.3601	.4156	.4707	.5251
22	.0210	.0781	.1352	.1920	.2487	.3050	.3610	.4166	.4716	.5260
23	.0219	.0791	.1361	.1930	.2496	.3060	.3619	.4175	.4725	.5269
24	.0229	.0800	.1371	.1939	.2506	.3069	.3629	.4184	.4734	.5278
25	.0238	.0810	.1380	.1949	.2515	.3078	.3638	.4193	.4743	.5287
26	.0248	.0819	.1390	.1958	.2525	.3088	.3647	.4202	.4752	.5296
27	.0257	.0829	.1399	.1968	.2534	.3097	.3657	.4212	.4761	.5305
28	.0267	.0838	.1409	.1977	.2543	.3107	.3666	.4221	.4771	.5314
29	.0276	.0848	.1418	.1987	.2553	.3116	.3675	.4230	.4780	.5323
30	.0286	.0857	.1428	.1996	.2562	.3125	.3684	.4239	.4789	.5333
31	.0295	.0867	.1437	.2006	.2572	.3135	.3694	.4248	.4798	.5342
32	.0305	.0876	.1447	.2015	.2581	.3144	.3703	.4258	.4807	.5351
33	.0314	.0886	.1456	.2025	.2590	.3153	.3712	.4267	.4816	.5360
34	.0324	.0895	.1466	.2034	.2600	.3163	.3722	.4276	.4825	.5369
35	.0334	.0905	.1475	.2043	.2609	.3172	.3731	.4285	.4834	.5378
36	.0343	.0914	.1485	.2053	.2619	.3181	.3740	.4294	.4843	.5387
37	.0353	.0924	.1494	.2062	.2628	.3191	.3749	.4304	.4853	.5396
38	.0362	.0933	.1504	.2072	.2637	.3200	.3759	.4313	.4862	.5405
39	.0372	.0943	.1513	.2081	.2647	.3209	.3768	.4322	.4871	.5414
40	.0381	.0952	.1523	.2091	.2656	.3219	.3777	.4331	.4880	.5423
41	.0391	.0962	.1532	.2100	.2666	.3228	.3787	.4341	.4889	.5432
42	.0400	.0971	.1541	.2110	.2675	.3238	.3796	.4350	.4898	.5441
43	.0410	.0981	.1551	.2119	.2685	.3247	.3805	.4359	.4907	.5450
44	.0419	.0990	.1560	.2129	.2694	.3256	.3814	.4368	.4916	.5459
45	.0429	.1000	.1570	.2138	.2703	.3266	.3824	.4377	.4926	.5468
46	.0438	.1009	.1579	.2147	.2713	.3275	.3833	.4387	.4935	.5477
47	.0448	.1019	.1589	.2157	.2722	.3284	.3842	.4396	.4944	.5486
48	.0457	.1029	.1598	.2166	.2732	.3294	.3852	.4405	.4953	.5495
49	.0467	.1038	.1608	.2176	.2741	.3303	.3861	.4414	.4962	.5504
50	.0476	.1048	.1617	.2185	.2750	.3312	.3870	.4423	.4971	.5513
51	.0486	.1057	.1627	.2195	.2760	.3322	.3879	.4433	.4980	.5522
52	.0495	.1067	.1636	.2204	.2769	.3331	.3889	.4442	.4989	.5531
53	.0505	.1076	.1646	.2214	.2779	.3340	.3898	.4451	.4998	.5540
54	.0515	.1086	.1655	.2223	.2788	.3350	.3907	.4460	.5008	.5549
55	.0524	.1095	.1665	.2233	.2797	.3359	.3917	.4469	.5017	.5558
56	.0534	.1105	.1674	.2242	.2807	.3369	.3926	.4479	.5026	.5567
57	.0543	.1114	.1684	.2252	.2816	.3378	.3935	.4488	.5035	.5576
58	.0553	.1124	.1693	.2261	.2826	.3387	.3944	.4497	.5044	.5585
59	.0562	.1133	.1703	.2270	.2835	.3397	.3954	.4506	.5053	.5594
60	.0572	.1143	.1712	.2280	.2845	.3406	.3963	.4515	.5062	.5603
	Add 0.05			Add 0.15				Add 0.2		

TABLE II—Continued.

Angle.	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°
0′	.5603	.6137	.6663	.7181	.7691	.8191	.8681	.9160	.9629	1.0085
1	.5612	.6145	.6672	.7190	.7699	.8199	.8689	.9168	.9636	1.0093
2	.5621	.6154	.6680	.7198	.7707	.8207	.8697	.9176	.9644	1.0100
3	.5629	.6163	.6689	.7207	.7716	.8215	.8705	.9184	.9652	1.0108
4	.5638	.6172	.6697	.7215	.7724	.8224	.8713	.9192	.9659	1.0115
5	.5647	.6181	.6706	.7224	.7732	.8232	.8721	.9199	.9667	1.0122
6	.5656	.6189	.6715	.7232	.7741	.8240	.8729	.9207	.9674	1.0130
7	.5665	.6198	.6723	.7241	.7749	.8248	.8737	.9215	.9682	1.0137
8	.5674	.6207	.6732	.7249	.7757	.8256	.8745	.9223	.9690	1.0145
9	.5683	.6216	.6740	.7258	.7766	.8265	.8753	.9231	.9697	1.0152
10	.5692	.6224	.6749	.7266	.7774	.8272	.8761	.9238	.9705	1.0160
11	.5701	.6233	.6758	.7275	.7782	.8281	.8769	.9246	.9712	1.0167
12	.5710	.6242	.6767	.7283	.7791	.8289	.8777	.9254	.9720	1.0174
13	.5718	.6251	.6775	.7292	.7799	.8297	.8785	.9262	.9728	1.0182
14	.5727	.6259	.6784	.7300	.7807	.8305	.8793	.9270	.9735	1.0189
15	.5736	.6268	.6792	.7309	.7816	.8313	.8801	.9277	.9743	1.0197
16	.5745	.6277	.6801	.7317	.7824	.8322	.8809	.9285	.9750	1.0204
17	.5754	.6286	.6810	.7326	.7832	.8330	.8817	.9293	.9758	1.0211
18	.5763	.6295	.6818	.7334	.7841	.8338	.8825	.9301	.9766	1.0219
19	.5772	.6303	.6827	.7343	.7849	.8346	.8833	.9309	.9773	1.0226
20	.5781	.6312	.6836	.7351	.7857	.8354	.8841	.9316	.9781	1.0234
21	.5790	.6321	.6844	.7359	.7856	.8362	.8849	.9324	.9789	1.0241
22	.5798	.6330	.6853	.7368	.7874	.8370	.8857	.9332	.9796	1.0248
23	.5807	.6338	.6861	.7376	.7882	.8379	.8865	.9340	.9804	1.0256
24	.5816	.6347	.6870	.7385	.7891	.8387	.8873	.9348	.9811	1.0263
25	.5825	.6356	.6879	.7393	.7899	.8395	.8881	.9355	.9819	1.0271
26	.5834	.6365	.6887	.7402	.7907	.8403	.8889	.9363	.9827	1.0278
27	.5843	.6374	.6896	.7410	.7916	.8411	.8897	.9371	.9834	1.0285
28	.5852	.6382	.6905	.7419	.7924	.8420	.8905	.9379	.9842	1.0293
29	.5861	.6391	.6913	.7427	.7932	.8428	.8913	.9387	.9849	1.0300
30	.5870	.6400	.6922	.7436	.7941	.8436	.8921	.9395	.9857	1.0308
31	.5879	.6409	.6931	.7444	.7949	.8444	.8929	.9402	.9865	1.0315
32	.5887	.6417	.6939	.7453	.7957	.8452	.8937	.9410	.9872	1.0322
33	.5896	.6426	.6948	.7461	.7966	.8460	.8945	.9418	.9880	1.0330
34	.5905	.6435	.6956	.7470	.7974	.8469	.8953	.9426	.9888	1.0337
35	.5914	.6444	.6965	.7478	.7982	.8477	.8961	.9434	.9895	1.0345
36	.5923	.6453	.6974	.7487	.7991	.8485	.8969	.9441	.9903	1.0352
37	.5932	.6461	.6982	.7495	.7999	.8493	.8977	.9449	.9910	1.0359
38	.5941	.6470	.6991	.7504	.8007	.8501	.8985	.9457	.9918	1.0367
39	.5950	.6479	.7000	.7512	.8016	.8510	.8993	.9465	.9926	1.0374
40	.5959	.6487	.7008	.7521	.8024	.8517	.9000	.9473	.9933	1.0382
41	.5968	.6496	.7017	.7529	.8032	.8526	.9008	.9480	.9941	1.0389
42	.5976	.6505	.7026	.7538	.8041	.8534	.9016	.9488	.9948	1.0397
43	.5985	.6514	.7034	.7546	.8049	.8542	.9024	.9496	.9956	1.0404
44	.5994	.6523	.7043	.7555	.8057	.8550	.9032	.9504	.9964	1.0411
45	.6003	.6531	.7051	.7563	.8066	.8558	.9040	.9512	.9971	1.0419
46	.6012	.6540	.7060	.7572	.8074	.8567	.9048	.9519	.9979	1.0426
47	.6021	.6549	.7069	.7580	.8082	.8575	.9056	.9527	.9986	1.0434
48	.6030	.6558	.7077	.7589	.8091	.8583	.9064	.9535	.9994	1.0441
49	.6039	.6567	.7086	.7597	.8099	.8591	.9072	.9543	1.0002	1.0448
50	.6048	.6575	.7095	.7606	.8107	.8599	.9080	.9551	1.0009	1.0456
51	.6056	.6584	.7103	.7614	.8116	.8607	.9088	.9558	1.0017	1.0463
52	.6065	.6593	.7112	.7623	.8124	.8616	.9096	.9566	1.0025	1.0471
53	.6074	.6602	.7121	.7631	.8132	.8624	.9104	.9574	1.0032	1.0478
54	.6083	.6610	.7129	.7640	.8141	.8632	.9112	.9582	1.0040	1.0485
55	.6092	.6619	.7138	.7648	.8149	.8640	.9120	.9590	1.0047	1.0493
56	.6101	.6628	.7146	.7657	.8157	.8648	.9128	.9597	1.0055	1.0500
57	.6110	.6637	.7155	.7665	.8166	.8657	.9136	.9605	1.0063	1.0508
58	.6119	.6646	.7164	.7674	.8174	.8665	.9144	.9613	1.0070	1.0515
59	.6128	.6654	.7172	.7682	.8182	.8673	.9152	.9621	1.0078	1.0522
60	.6137	.6663	.7181	.7691	.8191	.8681	.9160	.9629	1.0085	1.0530
	Add 0.2	Add 0.3				Add 0.4				Add 0.5

TABLE II—Continued.

Angle.	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°
0′	1.0530	1.0661	1.1380	1.1784	1.2174	1.2549	1.2909	1.3253	1.3581	1.3892
1	1.0537	1.0968	1.1386	1.1790	1.2180	1.2555	1.2915	1.3258	1.3586	1.3897
2	1.0544	1.0975	1.1393	1.1797	1.2186	1.2561	1.2920	1.3264	1.3591	1.3902
3	1.0551	1.0982	1.1400	1.1803	1.2193	1.2567	1.2926	1.3269	1.3596	1.3907
4	1.0559	1.0989	1.1407	1.1810	1.2199	1.2573	1.2932	1.3275	1.3602	1.3912
5	1.0566	1.0996	1.1413	1.1816	1.2205	1.2579	1.2937	1.3280	1.3607	1.3917
6	1.0573	1.1003	1.1420	1.1823	1.2211	1.2585	1.2943	1.3286	1.3612	1.3922
7	1.0580	1.1010	1.1427	1.1829	1.2218	1.2591	1.2949	1.3291	1.3617	1.3927
8	1.0587	1.1017	1.1434	1.1836	1.2224	1.2597	1.2955	1.3297	1.3622	1.3932
9	1.0595	1.1024	1.1440	1.1842	1.2230	1.2603	1.2960	1.3302	1.3628	1.3936
10	1.0602	1.1031	1.1447	1.1849	1.2236	1.2609	1.2966	1.3308	1.3633	1.3941
11	1.0609	1.1038	1.1454	1.1855	1.2243	1.2615	1.2972	1.3313	1.3638	1.3946
12	1.0616	1.1045	1.1460	1.1862	1.2249	1.2621	1.2978	1.3319	1.3643	1.3951
13	1.0623	1.1052	1.1467	1.1868	1.2255	1.2627	1.2983	1.3324	1.3648	1.3956
14	1.0631	1.1059	1.1474	1.1875	1.2261	1.2633	1.2989	1.3329	1.3654	1.3961
15	1.0638	1.1066	1.1481	1.1881	1.2268	1.2639	1.2995	1.3335	1.3659	1.3966
16	1.0645	1.1073	1.1487	1.1888	1.2274	1.2645	1.3001	1.3340	1.3664	1.3971
17	1.0652	1.1080	1.1494	1.1894	1.2280	1.2651	1.3006	1.3346	1.3669	1.3976
18	1.0659	1.1087	1.1502	1.1901	1.2286	1.2657	1.3012	1.3351	1.3674	1.3981
19	1.0667	1.1094	1.1509	1.1907	1.2293	1.2663	1.3018	1.3357	1.3680	1.3986
20	1.0674	1.1101	1.1514	1.1914	1.2299	1.2669	1.3024	1.3362	1.3685	1.3991
21	1.0681	1.1108	1.1521	1.1992	1.2305	1.2675	1.3029	1.3368	1.3690	1.3995
22	1.0688	1.1115	1.1528	1.1927	1.2311	1.2681	1.3035	1.3373	1.3695	1.4000
23	1.0695	1.1122	1.1535	1.1933	1.2318	1.2687	1.3041	1.3379	1.3700	1.4005
24	1.0702	1.1129	1.1541	1.1940	1.2324	1.2693	1.3046	1.3384	1.3705	1.4010
25	1.0710	1.1136	1.1548	1.1946	1.2330	1.2699	1.3052	1.3390	1.3711	1.4015
26	1.0717	1.1143	1.1555	1.1953	1.2336	1.2705	1.3058	1.3395	1.3716	1.4020
27	1.0724	1.1150	1.1562	1.1959	1.2343	1.2711	1.3064	1.3400	1.3721	1.4025
28	1.0731	1.1157	1.1568	1.1966	1.2349	1.2717	1.3069	1.3406	1.3726	1.4030
29	1.0738	1.1164	1.1575	1.1972	1.2355	1.2723	1.3075	1.3411	1.3731	1.4035
30	1.0746	1.1171	1.1582	1.1979	1.2361	1.2729	1.3081	1.3417	1.3737	1.4040
31	1.0753	1.1177	1.1589	1.1985	1.2368	1.2735	1.3086	1.3422	1.3742	1.4045
32	1.0760	1.1184	1.1595	1.1992	1.2374	1.2741	1.3092	1.3428	1.3747	1.4049
33	1.0767	1.1191	1.1602	1.1998	1.2380	1.2747	1.3098	1.3433	1.3752	1.4054
34	1.0774	1.1198	1.1609	1.2000	1.2386	1.2753	1.3104	1.3439	1.3757	1.4059
35	1.0782	1.1205	1.1616	1.2011	1.2393	1.2759	1.3110	1.3444	1.3763	1.4064
36	1.0789	1.1212	1.1622	1.2018	1.2399	1.2765	1.3115	1.3450	1.3768	1.4069
37	1.0796	1.1219	1.1629	1.2024	1.2405	1.2771	1.3121	1.3455	1.3773	1.4074
38	1.0803	1.1226	1.1636	1.2031	1.2411	1.2777	1.3127	1.3461	1.3778	1.4079
39	1.0810	1.1233	1.1642	1.2037	1.2418	1.2783	1.3132	1.3466	1.3783	1.4084
40	1.0818	1.1240	1.1649	1.2044	1.2424	1.2789	1.3138	1.3472	1.3789	1.4089
41	1.0825	1.1247	1.1656	1.2050	1.2430	1.2795	1.3144	1.3477	1.3794	1.4094
42	1.0832	1.1254	1.1663	1.2057	1.2436	1.2801	1.3150	1.3483	1.3799	1.4099
43	1.0839	1.1261	1.1669	1.2063	1.2443	1.2807	1.3155	1.3488	1.3804	1.4103
44	1.0846	1.1268	1.1676	1.2070	1.2449	1.2813	1.3161	1.3493	1.3809	1.4108
45	1.0853	1.1275	1.1683	1.2076	1.2455	1.2819	1.3167	1.3499	1.3814	1.4113
46	1.0861	1.1282	1.1690	1 2083	1.2461	1.2825	1.3173	1.3504	1.3820	1.4118
47	1.0868	1.1289	1.1696	1.2089	1.2468	1.2831	1.3178	1.3510	1.3825	1.4123
48	1.0875	1.1296	1.1703	1.2096	1.2474	1.2837	1.3184	1.3515	1.3830	1.4128
49	1.0882	1.1303	1.1710	1.2102	1.2480	1.2843	1.3190	1.3521	1.3835	1.4133
50	1.0889	1.1310	1.1717	1.2109	1.2486	1.2849	1.3196	1.3526	1.3840	1.4138
51	1.0897	1.1317	1.1723	1.2115	1.2493	1.2855	1.3201	1.3532	1.3846	1.4143
52	1.0904	1.1324	1.1730	1.2122	1.2499	1.2861	1.3207	1.3537	1.3851	1.4148
53	1.0911	1.1331	1.1737	1.2128	1.2505	1.2867	1.3213	1.3543	1.3856	1.4153
54	1.0918	1.1338	1.1744	1.2135	1.2511	1.2873	1.3218	1.3548	1.3861	1.4157
55	1.0925	1.1345	1.1750	1.2141	1.2518	1.2879	1.3224	1.3554	1.3866	1.4162
56	1.0933	1.1352	1.1757	1.2148	1.2524	1.2885	1.3230	1.3559	1.3872	1.4167
57	1.0940	1.1359	1.1764	1.2154	1.2530	1.2891	1.3236	1.3564	1.3877	1.4172
58	1.0947	1.1366	1.1771	1.2161	1.2536	1.2897	1.3241	1.3570	1.3882	1.4177
59	1.0954	1.1373	1.1773	1.2167	1.2543	1.2903	1.3247	1.3575	1.3887	1.4182
60	1.0961	1.1380	1.1784	1.2174	1.2549	1.2909	1.3253	1.3581	1.3892	1.4187
	Add 0.5				Add 0.6					Add 0.7

TABLE III.—*To reduce readings on a slope to horizontal distance.*

Angle.	2°	3°	4°	5°	6°	7°	8°	9°	10°
0′	.0012	.0027	.0049	.0076	.0109	.0149	.0194	.0245	.0302
2	.0013	.0028	.0049	.0077	.0110	.0150	.0195	.0247	.0304
4	.0013	.0029	.0050	.0078	.0112	.0151	.0197	.0248	.0306
6	.0013	.0029	.0051	.0079	.0113	.0153	.0199	.0250	.0308
8	.0014	.0030	.0052	.0080	.0114	.0254	.0200	.0252	.0310
10	.0014	.0030	.0053	.0081	.0115	.0156	.0202	.0254	.0312
12	.0015	.0031	.0054	.0082	.0117	.0157	.0203	.0256	.0314
14	.0015	.0032	.0054	.0083	.0118	.0158	.0205	.0257	.0316
16	.0016	.0032	.0055	.0084	.0119	.0160	.0207	.0259	.0318
18	.0016	.0033	.0056	.0085	.0120	.0161	.0208	.0261	.0320
20	.0017	.0034	.0057	.0086	.0122	.0163	.0210	.0263	.0322
22	.0017	.0035	.0058	.0087	.0123	.0164	.0212	.0265	.0324
24	.0017	.0035	.0059	.0089	.0124	.0166	.0213	.0267	.0326
26	.0018	.0036	.0060	.0090	.0126	.0167	.0215	.0269	.0328
28	.0018	.0037	.0061	.0092	.0127	.0169	.0217	.0271	.0330
30	.0019	.0037	.0062	.0092	.0128	.0170	.0218	.0272	.0332
32	.0019	.0038	.0062	.0093	.0129	.0172	.0220	.0274	.0334
34	.0020	.0039	.0063	.0094	.0131	.0173	.0222	.0276	.0336
36	.0021	.0039	.0064	.0095	.0132	.0175	.0224	.0278	.0338
38	.0021	.0040	.0065	.0096	.0133	.0176	.0225	.0280	.0340
40	.0022	.0041	.0066	.0097	.0135	.0178	.0227	.0282	.0342
42	.0022	.0042	.0067	.0098	.0136	.0180	.0229	.0284	.0345
44	.0023	.0042	.0068	.0100	.0137	.0181	.0231	.0286	.0347
46	.0023	.0043	.0069	.0101	.0139	.0183	.0232	.0288	.0349
48	.0024	.0044	.0070	.0102	.0140	.0184	.0234	.0290	.0351
50	.0024	.0045	.0071	.0103	.0142	.0186	.0236	.0292	.0353
52	.0025	.0045	.0072	.0104	.0143	.0187	.0238	.0294	.0355
54	.0026	.0046	.0073	.0106	.0144	.0189	.0239	.0296	.0358
56	.0026	.0047	.0074	.0107	.0146	.0190	.0241	.0298	.0360
58	.0027	.0048	.0075	.0108	.0147	.0192	.0243	.0300	.0362
60	.0027	.0049	.0076	.0109	.0149	.0194	.0245	.0302	.0364

TABLE III—Continued.

Angle.	11°	12°	13°	14°	15°	16°	17°	18°	19°
0′	.0364	.0432	.0506	.0585	.0670	.0760	.0855	.0955	.1060
2	.0366	.0435	.0509	.0588	.0673	.0763	.0858	.0958	.1064
4	.0368	.0437	.0511	.0591	.0676	.0766	.0861	.0962	.1067
6	.0371	.0439	.0514	.0594	.0679	.0769	.0865	.0965	.1071
8	.0373	.0442	.0516	.0596	.0682	.0772	.0868	.0969	.1074
10	.0375	.0444	.0519	.0599	.0685	.0775	.0871	.0972	.1078
12	.0377	.0447	.0521	.0602	.0687	.0778	.0874	.0976	.1082
14	.0379	.0449	.0524	.0605	.0690	.0782	.0878	.0979	.1085
16	.0382	.0451	.0527	.0607	.0693	.0785	.0881	.0982	.1089
18	.0384	.0454	.0529	.0610	.0696	.0788	.0884	.0986	.1092
20	.0386	.0456	.0532	.0613	.0699	.0791	.0888	.0989	.1096
22	.0388	.0459	.0534	.0616	.0702	.0794	.0891	.0993	.1099
24	.0391	.0461	.0537	.0619	.0705	.0797	.0894	.0996	.1103
26	.0393	.0464	.0540	.0621	.0708	.0800	.0898	.1000	.1107
28	.0395	.0466	.0542	.0624	.0711	.0804	.0901	.1003	.1111
30	.0397	.0469	.0545	.0627	.0714	.0807	.0904	.1007	.1114
32	.0400	.0471	.0548	.0630	.0717	.0810	.0908	.1010	.1118
34	.0402	.0473	.0550	.0633	.0720	.0813	.0911	.1014	.1122
36	.0404	.0476	.0553	.0635	.0723	.0816	.0914	.1017	.1125
38	.0407	.0478	.0556	.0638	.0726	.0819	.0918	.1021	.1129
40	.0409	.0481	.0558	.0641	.0729	.0822	.0921	.1024	.1133
42	.0411	.0483	.0561	.0644	.0732	.0826	.0924	.1028	.1136
44	.0414	.0486	.0564	.0647	.0735	.0829	.0928	.1032	.1140
46	.0416	.0488	.0566	.0650	.0738	.0832	.0931	.1035	.1144
48	.0418	.0491	.0569	.0653	.0741	.0835	.0935	.1039	.1147
50	.0421	.0493	.0572	.0656	.0744	.0839	.0938	.1042	.1150
52	.0423	.0496	.0574	.0658	.0747	.0842	.0941	.1046	.1155
54	.0425	.0498	.0577	.0661	.0750	.0845	.0945	.1049	.1159
56	.0428	.0501	.0580	.0664	.0754	.0848	.0948	.1053	.1162
58	.0430	.0504	.0583	.0667	.0757	.0852	.0952	.1056	.1166
60	.0432	.0506	.0585	.0670	.0760	.0855	.0955	.1060	.1170

Table III—Continued.

Angle.	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°
0′	.1170	.1284	.1403	.1527	.1654	.1786	.1922	.2061	.2204	.2350
2	.1174	.1288	.1407	.1531	.1659	.1791	.1926	.2066	.2209	.2355
4	.1177	.1292	.1411	.1535	.1663	.1795	.1931	.2071	.2214	.2360
6	.1181	.1296	.1416	.1539	.1667	.1800	.1936	.2075	.2219	.2365
8	.1185	.1300	.1420	.1544	.1672	.1804	.1940	.2080	.2224	.2370
10	.1189	.1304	.1424	.1548	.1676	.1809	.1945	.2085	.2228	.2375
12	.1192	.1308	.1428	.1552	.1680	.1813	.1950	.2090	.2233	.2380
14	.1196	.1312	.1432	.1556	.1685	.1818	.1954	.2094	.2238	.2385
16	.1200	.1316	.1436	.1560	.1689	.1822	.1959	.2099	.2243	.2390
18	.1204	.1320	.1440	.1565	.1693	.1827	.1964	.2104	.2248	.2395
20	.1207	.1323	.1444	.1569	.1698	.1831	.1968	.2109	.2253	.2400
22	.1211	.1327	.1448	.1573	.1702	.1836	.1973	.2113	.2258	.2405
24	.1215	.1331	.1452	.1577	.1707	.1840	.1978	.2118	.2263	.2410
26	.1219	.1335	.1456	.1582	.1711	.1845	.1982	.2123	.2267	.2415
28	.1223	.1339	.1460	.1586	.1715	.1849	.1987	.2128	.2272	.2420
30	.1227	.1343	.1465	.1590	.1720	.1854	.1991	.2133	.2277	.2425
32	.1230	.1347	.1469	.1594	.1724	.1858	.1996	.2137	.2282	.2430
34	.1234	.1351	.1473	.1599	.1729	.1863	.2001	.2142	.2287	.2435
36	.1238	.1355	.1477	.1603	.1733	.1867	.2005	.2147	.2292	.2440
38	.1242	.1359	.1481	.1607	.1737	.1872	.2010	.2152	.2297	.2445
40	.1246	.1363	.1485	.1611	.1742	.1877	.2015	.2156	.2302	.2450
42	.1249	.1367	.1489	.1616	.1746	.1881	.2019	.2161	.2306	.2455
44	.1253	.1371	.1493	.1620	.1751	.1886	.2024	.2166	.2311	.2460
46	.1257	.1375	.1498	.1624	.1755	.1890	.2029	.2171	.2316	.2465
48	.1261	.1379	.1502	.1629	.1759	.1895	.2033	.2175	.2321	.2470
50	.1265	.1383	.1506	.1633	.1764	.1899	.2038	.2180	.2326	.2475
52	.1269	.1387	.1510	.1637	.1768	.1904	.2043	.2185	.2331	.2480
54	.1273	.1391	.1514	.1641	.1773	.1908	.2047	.2190	.2336	.2485
56	.1277	.1395	.1718	.1646	.1777	.1913	.2052	.2194	.2341	.2490
58	.1280	.1400	.1523	.1650	.1782	.1917	.2057	.2199	.2346	.2495
60	.1284	.1403	.1527	.1654	.1786	.1922	.2061	.2204	.2350	.2500

Table IV.—*Correction for curvature and refraction.*

Distance.	Correction.
Metres.	*Feet.*
100	0.002
200	0.009
300	0.020
400	0.036
500	0.056
600	0.081
700	0.110
800	0.143
900	0.181
1,000	0.224
1,100	0.271
1,200	0.323

TABLE V.—*For converting feet into metres.*

Feet.	Metres.	Feet.	Metres.	Feet.	Metres.	Feet.	Metres.	Feet.	Metres.
		600	182.9	1,200	365.8	1,800	548.6	2,400	731.5
10	3.0	610	185.9	1,210	368.8	1,810	551.7	2,410	734.6
20	6.1	620	189.0	1,220	371.8	1,820	554.7	2,420	737.6
30	9.1	630	192.0	1,230	374.9	1,830	557.8	2,430	740.6
40	12.2	640	195.1	1,240	377.9	1,840	560.8	2,440	743.7
50	15.2	650	198.1	1,250	381.0	1,850	563.9	2,450	746.7
60	18.3	660	201.2	1,260	384.0	1,860	566.9	2,460	749.8
70	21.3	670	204.2	1,270	387.1	1,870	570.0	2,470	752.8
80	24.4	680	207.3	1,280	390.1	1,880	573.0	2,480	755.9
90	27.4	690	210.3	1,290	393.2	1,890	576.1	2,490	758.9
100	30.5	700	213.4	1,300	396.2	1,900	579.1	2,500	762.0
110	33.5	710	216.4	1,310	399.3	1,910	582.2	2,510	765.0
120	36.6	720	219.5	1,320	402.3	1,920	585.2	2,520	768.1
130	39.6	730	222.5	1,330	405.4	1,930	588.3	2,530	771.1
140	42.7	740	225.5	1,340	408.4	1,940	591.3	2,540	774.2
150	45.7	750	228.6	1,350	411.5	1,950	594.3	2,550	777.2
160	48.8	760	231.6	1,360	414.5	1,960	597.4	2,560	780.3
170	51.8	770	234.7	1,370	417.6	1,970	600.4	2,570	783.3
180	54.9	780	237.7	1,380	420.6	1,980	603.5	2,580	786.4
190	57.9	790	240.8	1,390	423.7	1,990	606.5	2,590	789.4
200	61.0	800	243.8	1,400	426.7	2,000	609.6	2,600	792.5
210	64.0	810	246.9	1,410	429.8	2,010	612.6	2,610	795.5
220	67.1	820	249.9	1,420	432.8	2,020	615.7	2,620	798.6
230	70.1	830	253.0	1,430	435.9	2,030	618.7	2,630	801.6
240	73.2	840	256.0	1,440	438.9	2,040	621.8	2,640	804.7
250	76.2	850	259.1	1,450	441.9	2,050	624.8	2,250	807.7
260	79.2	860	262.1	1,460	445.0	2,060	627.9	2,660	810.7
270	82.3	870	265.2	1,470	448.0	2,070	630.9	2,670	813.8
280	85.3	880	268.2	1,480	451.1	2,080	634.0	2,680	816.8
290	88.4	890	271.3	1,490	454.1	2,090	637.0	2,690	819.9
300	91.4	900	274.3	1,500	457.2	2,100	640.1	2,700	822.9
310	94.5	910	277.4	1,510	460.2	2,110	643.1	2,710	826.0
320	97.5	920	280.4	1,520	463.3	2,120	646.2	2,720	829.0
330	100.6	930	283.5	1,530	466.3	2,130	649.2	2,730	832.1
340	103.6	940	286.5	1,540	469.4	2,140	652.3	2,740	835.1
350	106.7	950	289.6	1,550	472.4	2,150	655.3	2,750	838.2
360	109.7	960	292.6	1,560	475.5	2,160	658.4	2,760	841.2
370	112.8	970	295.6	1,570	478.5	2,170	661.4	2,770	844.3
380	115.8	980	298.7	1,580	481.6	2,180	664.4	2,780	847.3
390	118.9	990	301.7	1,590	484.6	2,190	667.5	2,790	850.4
400	121.9	1,000	304.8	1,600	487.7	2,200	670.5	2,800	853.4
410	125.0	1,010	307.8	1,610	490.7	2,210	673.6	2,810	856.5
420	128.0	1,020	310.9	1,620	493.8	2,220	676.6	2,820	859.5
430	131.1	1,030	313.9	1,630	496.8	2,230	679.7	2,830	862.6
440	134.1	1,040	317.0	1,640	499.9	2,240	682.7	2,840	865.6
450	137.2	1,050	320.0	1,650	502.9	2,250	685.8	2,850	868.7
460	140.2	1,060	323.1	1,660	506.0	2,260	688.8	2,860	871.7
470	143.3	1,070	326.1	1,670	509.0	2,270	691.9	2,870	874.8
480	146.3	1,080	329.2	1,680	512.0	2,280	694.9	2,880	877.8
490	149.3	1,090	332.2	1,690	515.1	2,290	698.0	2,890	880.8
500	152.4	1,100	335.3	1,700	518.2	2,300	701.0	2,900	883.9
510	155.4	1,110	338.3	1,710	521.2	2,310	704.1	2,910	887.0
520	158.5	1,120	341.4	1,720	524.2	2,320	707.1	2,920	890.0
530	161.5	1,130	344.4	1,730	527.3	2,330	710.2	2,930	893.0
540	164.6	1,140	347.5	1,740	530.3	2,340	713.2	2,940	896.1
550	167.6	1,150	350.5	1,750	533.4	2,350	716.3	2,950	899.1
560	170.7	1,160	353.6	1,760	536.4	2,360	719.3	2,960	902.2
570	173.7	1,170	356.6	1,770	539.5	2,370	722.4	2,970	905.2
580	176.8	1,180	359.6	1,780	542.5	2,380	725.4	2,980	908.3
590	179.8	1,190	362.7	1,790	545.6	2,390	728.5	2,990	911.3
600	182.9	1,200	365.8	1,800	548.6	2,400	731.5	3,000	914.4

TABLE III—Continued.

Angle.	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°
0′	.1170	.1284	.1403	.1527	.1654	.1786	.1922	.2061	.2204	.2350
2	.1174	.1288	.1407	.1531	.1659	.1791	.1926	.2066	.2209	.2355
4	.1177	.1292	.1411	.1535	.1663	.1795	.1931	.2071	.2214	.2360
6	.1181	.1296	.1416	.1539	.1667	.1800	.1936	.2075	.2219	.2365
8	.1185	.1300	.1420	.1544	.1672	.1804	.1940	.2080	.2224	.2370
10	.1189	.1304	.1424	.1548	.1676	.1809	.1945	.2085	.2228	.2375
12	.1192	.1308	.1428	.1552	.1680	.1813	.1950	.2090	.2233	.2380
14	.1196	.1312	.1432	.1556	.1685	.1818	.1954	.2094	.2238	.2385
16	.1200	.1316	.1436	.1560	.1689	.1822	.1959	.2099	.2243	.2390
18	.1204	.1320	.1440	.1565	.1693	.1827	.1964	.2104	.2248	.2395
20	.1207	.1323	.1444	.1569	.1698	.1831	.1968	.2109	.2253	.2400
22	.1211	.1327	.1448	.1573	.1702	.1836	.1973	.2113	.2258	.2405
24	.1215	.1331	.1452	.1577	.1707	.1840	.1978	.2118	.2263	.2410
26	.1219	.1335	.1456	.1582	.1711	.1845	.1982	.2123	.2267	.2415
28	.1223	.1339	.1460	.1586	.1715	.1849	.1987	.2128	.2272	.2420
30	.1227	.1343	.1465	.1590	.1720	.1854	.1991	.2133	.2277	.2425
32	.1230	.1347	.1469	.1594	.1724	.1858	.1996	.2137	.2282	.2430
34	.1234	.1351	.1473	.1599	.1729	.1863	.2001	.2142	.2287	.2435
36	.1238	.1355	.1477	.1603	.1733	.1867	.2005	.2147	.2292	.2440
38	.1242	.1359	.1481	.1607	.1737	.1872	.2010	.2152	.2297	.2445
40	.1246	.1363	.1485	.1611	.1742	.1877	.2015	.2156	.2302	.2450
42	.1249	.1367	.1489	.1616	.1746	.1881	.2019	.2161	.2306	.2455
44	.1253	.1371	.1493	.1620	.1751	.1886	.2024	.2166	.2311	.2460
46	.1257	.1375	.1498	.1624	.1755	.1890	.2029	.2171	.2316	.2465
48	.1261	.1379	.1502	.1629	.1759	.1895	.2033	.2175	.2321	.2470
50	.1265	.1383	.1506	.1633	.1764	.1899	.2038	.2180	.2326	.2475
52	.1269	.1387	.1510	.1637	.1768	.1904	.2043	.2185	.2331	.2480
54	.1273	.1391	.1514	.1641	.1773	.1908	.2047	.2190	.2336	.2485
56	.1277	.1395	.1718	.1646	.1777	.1913	.2052	.2194	.2341	.2490
58	.1280	.1400	.1523	.1650	.1782	.1917	.2057	.2199	.2346	.2495
60	.1284	.1403	.1527	.1654	.1786	.1922	.2061	.2204	.2350	.2500

TABLE IV.—*Correction for curvature and refraction.*

Distance.	Correction.
Metres.	*Feet.*
100	0.002
200	0.009
300	0.020
400	0.036
500	0.056
600	0.081
700	0.110
800	0.143
900	0.181
1,000	0.224
1,100	0.271
1,200	0.323

TABLE V.—*For converting feet into metres.*

Feet.	Metres.	Feet.	Metres.	Feet.	Metres.	Feet.	Metres.	Feet.	Metres.
		600	182.9	1,200	365.8	1,800	548.6	2,400	731.5
10	3.0	610	185.9	1,210	368.8	1,810	551.7	2,410	734.6
20	6.1	620	189.0	1,220	371.8	1,820	554.7	2,420	737.6
30	9.1	630	192.0	1,230	374.9	1,830	557.8	2,430	740.6
40	12.2	640	195.1	1,240	377.9	1,840	560.8	2,440	743.7
50	15.2	650	198.1	1,250	381.0	1,850	563.9	2,450	746.7
60	18.3	660	201.2	1,260	384.0	1,860	566.9	2,460	749.8
70	21.3	670	204.2	1,270	387.1	1,870	570.0	2,470	752.8
80	24.4	680	207.3	1,280	390.1	1,880	573.0	2,480	755.9
90	27.4	690	210.3	1,290	393.2	1,890	576.1	2,490	758.9
100	30.5	700	213.4	1,300	396.2	1,900	579.1	2,500	762.0
110	33.5	710	216.4	1,310	399.3	1,910	582.2	2,510	765.0
120	36.6	720	219.5	1,320	402.3	1,920	585.2	2,520	768.1
130	39.6	730	222.5	1,330	405.4	1,930	588.3	2,530	771.1
140	42.7	740	225.5	1,340	408.4	1,940	591.3	2,540	774.2
150	45.7	750	228.6	1,350	411.5	1,950	594.3	2,550	777.2
160	48.8	760	231.6	1,360	414.5	1,960	597.4	2,560	780.3
170	51.8	770	234.7	1,370	417.6	1,970	600.4	2,570	783.3
180	54.9	780	237.7	1,380	420.6	1,980	603.5	2,580	786.4
190	57.9	790	240.8	1,390	423.7	1,990	606.5	2,590	789.4
200	61.0	800	243.8	1,400	426.7	2,000	609.6	2,600	792.5
210	64.0	810	246.9	1,410	429.8	2,010	612.6	2,610	795.5
220	67.1	820	249.9	1,420	432.8	2,020	615.7	2,620	798.6
230	70.1	830	253.0	1,430	435.9	2,030	618.7	2,630	801.6
240	73.2	840	256.0	1,440	438.9	2,040	621.8	2,640	804.7
250	76.2	850	259.1	1,450	441.9	2,050	624.8	2,250	807.7
260	79.2	860	262.1	1,460	445.0	2,060	627.9	2,660	810.7
270	82.3	870	265.2	1,470	448.0	2,070	630.9	2,670	813.8
280	85.3	880	268.2	1,480	451.1	2,080	634.0	2,680	816.8
290	88.4	890	271.3	1,490	454.1	2,090	637.0	2,690	819.9
300	91.4	900	274.3	1,500	457.2	2,100	640.1	2,700	822.9
310	94.5	910	277.4	1,510	460.2	2,110	643.1	2,710	826.0
320	97.5	920	280.4	1,520	463.3	2,120	646.2	2,720	829.0
330	100.6	930	283.5	1,530	466.3	2,130	649.2	2,730	832.1
340	103.6	940	286.5	1,540	469.4	2,140	652.3	2,740	835.1
350	106.7	950	289.6	1,550	472.4	2,150	655.3	2,750	838.2
360	109.7	960	292.6	1,560	475.5	2,160	658.4	2,760	841.2
370	112.8	970	295.6	1,570	478.5	2,170	661.4	2,770	844.3
380	115.8	980	298.7	1,580	481.6	2,180	664.4	2,780	847.3
390	118.9	990	301.7	1,590	484.6	2,190	667.5	2,790	850.4
400	121.9	1,000	304.8	1,600	487.7	2,200	670.5	2,800	853.4
410	125.0	1,010	307.8	1,610	490.7	2,210	673.6	2,810	856.5
420	128.0	1,020	310.9	1,620	493.8	2,220	676.6	2,820	859.5
430	131.1	1,030	313.9	1,630	496.8	2,230	679.7	2,830	862.6
440	134.1	1,040	317.0	1,640	499.9	2,240	682.7	2,840	865.6
450	137.2	1,050	320.0	1,650	502.9	2,250	685.8	2,850	868.7
460	140.2	1,060	323.1	1,660	506.0	2,260	688.8	2,860	871.7
470	143.3	1,070	326.1	1,670	509.0	2,270	691.9	2,870	874.8
480	146.3	1,080	329.2	1,680	512.0	2,280	694.9	2,880	877.8
490	149.3	1,090	332.2	1,690	515.1	2,290	698.0	2,890	880.8
500	152.4	1,100	335.3	1,700	518.2	2,300	701.0	2,900	883.9
510	155.4	1,110	338.3	1,710	521.2	2,310	704.1	2,910	887.0
520	158.5	1,120	341.4	1,720	524.2	2,320	707.1	2,920	890.0
530	161.5	1,130	344.4	1,730	527.3	2,330	710.2	2,930	893.0
540	164.6	1,140	347.5	1,740	530.3	2,340	713.2	2,940	896.1
550	167.6	1,150	350.5	1,750	533.4	2,350	716.3	2,950	899.1
560	170.7	1,160	353.6	1,760	536.4	2,360	719.3	2,960	902.2
570	173.7	1,170	356.6	1,770	539.5	2,370	722.4	2,970	905.2
580	176.8	1,180	359.6	1,780	542.5	2,380	725.4	2,980	908.3
590	179.8	1,190	362.7	1,790	545.6	2,390	728.5	2,990	911.3
600	182.9	1,200	365.8	1,800	548.6	2,400	731.5	3,000	914.4

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